RAILROAD GAZETTE

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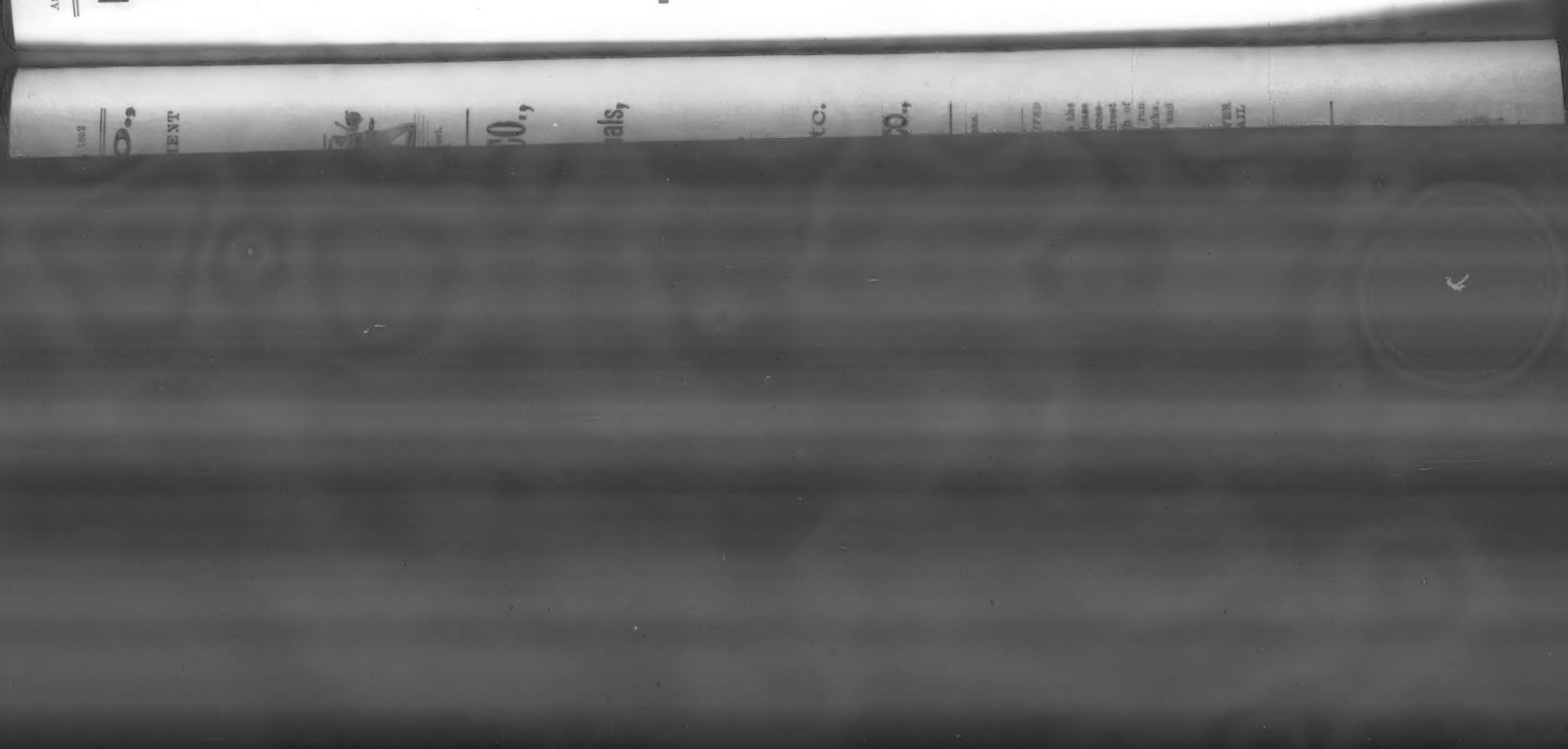

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RAILROAD GAZETTE DIRECTORY: CLASSIFIED ADVERTISEMENTS.

Air Brake Fittings
Stanley G. Flagg & Co., Phila.

Air Brake Hose
N.Y. Belt. & Pack. Co., 15 Park Row, N.Y.
Peerless Rubber Co., 15 Warren St.

Air Brake Regulator
Mason Regulator Co., Boston.

Air Compressors & Rock Drills
Ingersoll-Sergeant Rock Drill Co., 10 Park Place, N. Y.
Rand Drill Co., 23 Park Place, N. Y.

Aluminum
Pittsburgh Reduction Co.

Architect
Bradford L. Gilbert, 50 Broadway, N. Y.
Thomas Appleton, 505 Rialto Bldg., Chic.

Architectural Iron Work
King Bridge Co., Cleveland, O.

Asbestos Packing
H. W. Johns Mfg. Co., N. Y. City.

Asphalt Pavement
Wehn Pavement Co., 16 Exch. Pl., N. Y.

Axles
Cambria Iron Co., Johnstown, Pa.
Lima Machine Works, Lima O.
Louisville Steam Forge Co., Louisv., Ky.
Mich. Forge & Iron Co., Detroit, Mich.
Midvale Steel Co., Nicetown, Phila.
Pittsb'gh Forge & Iron Co., Pittsb., Pa.
T. Prosser & Son, 15 Gold St., N. Y.

Balanced Slide-Valves
M. C. Hammett, Troy, N. Y.

Ballast Unloaders
Marion Steam Shovel Co., Marion, O.

Bankers
Brown Bros. & Co., 59 Wall street, N. Y

Bell Cord & Couplings
Samson Cordage Works, Boston, Mass.

Bollers
Abendroth & Root Mfg. Co., 28 Cliff St., N.Y.
Lidgerwood Mfg. Co., 96 Lib'ty St., N.Y.
Rich. Loco. & Mach. Co., Richmond, Va.

Boiler Plate
Schoenberger & Co., Pittsburgh, Pa.

Bolt Cutters
Acme Machinery Co., Cleveland O.
Howard Iron Works, Buffalo, N. Y.

Bolts & Nuts
Fuller Bros. & Co., 139 Gr'nwich St., N.Y.
Rhode Island Tool Co., Providence.

Books & Publications
E. & F. N. Spon & Co., 12 Cortl'dt St., N.Y.
John C. Trautwine, Jr.

Brake Adjusters
Q. & C. Co., Chicago.

Brake Beams
Nat. Hollow Brake Beam Co., Chic., Ill.
Northwestern Equipment Co., Chicago.
Schoen Mfg. Co., Pittsburgh.

Brakes
Boyden Brake Co., Baltimore, Md.
Westinghouse Air-Brake Co., Pittsb., Pa.

Brake-Shoes
Congdon Brake-Shoe Co., Chicago, Ill.
Ramapo (N. Y.) Wheel & Foundry Co.

Bridges
Anderson & Barr, Jersey City, N. J.
Berlin Iron Bridge Co., E. Berlin, Conn.
Boston Bridge Works, Boston, Mass.
Chicago Bridge & Iron Co., Chicago, Ill.
Cofrode & Saylor, Philadelphia, Pa.
Detroit Bridge & Iron Wks, Det., Mich.
Edge Moor Bridge Wks, Wilmington, Del.
Elmira Bridge Co., Elmira, N. Y.
S. W. Prescolu, World Bldg., N. Y.
Keystone Bridge Co., Pittsburgh, Pa.
King Bridge Co., Cleveland, O.
Louisville Bridge & Iron Co., Louisv., Ky.
Mo. Val. Br. & Ir. Wks., Leavenw., Kan.
Mt Vernon Bridge Co., Mt. Vernon, O.
New Jersey Steel & Iron Co., Trenton.
Passaic Rolling Mill, Paterson, N. J.
Phoenixville Bridge Co., Phila., Pa.
Pittsburgh Bridge Co., 1105 Owings Bldg. Chicago.
Pottsville Bridge Co., Phila.
Rochester Bridge & Ir. W'ks, Rochester.
A. & P. Roberts & Co., Philadelphia, Pa.
San Francisco Bridge Co., California.
Shaffer & Schniglau, Chicago, Ill.
Shiffler Bridge Co., Pittsburgh, Pa.
Sooysmith & Co., 2 Nassau street, N. Y.
Union Bridge Co., 18 Broadway, N. Y.
J. A. L. Waddell, Kansas City, Mo.
Wallis Iron Works, Jersey City, N. J.
Youngstown (Ohio) Bridge Co.

Bridge Machinery
Vulcan Iron Works, Chicago.

Bridge Timbers
Alexander McClure, Pittsburgh, Pa.

Buildings
Berlin Iron Bridge Co., E. Berlin, Conn.

Bulldozers
Williams, White & Co., Moline, Ill.

Cars
Allison Mfg. Co., Philadelphia, Pa.
Bloomsburg Car Co., Bloomsburg, Pa.
Osgood Bradley & Sons, Worcester, Mass.
J. G. Brill & Co., Philadelphia, Pa.
Canda Mfg. Co., 11 Pine St., N. Y.
Reginald Canning & Co., 115 B'way, N.Y.
Ensign Mfg. Co., Huntington, West Va
Erie Car Works (Limited), Erie, Pa.
Harvey Steel Car Co., Chicago., Ill.
Jackson & Sharp Co., Wilmington, Del.
Jackson & Woodin Mfg. Co., Berwick, Pa.
A. S. Males & Co., Cincinnati.
Middletown Car W'ks, Middletown, Pa.
N. Y. Equipment Co., 15 Wall St., N. Y.
R. M. Pancoast, Camden, N. J.
Pardee Car & Mach. Wks, Watsont'n, Pa.
South Baltimore Car Works, Baltimore.
St. Charles Car Co., St. Charles, Mo.
Wason Mfg. Co., Springfield, Mass.
Youngstown (Ohio) Car Mfg. Co.

Cars, Second Hand
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati.
N. Y. Equipment Co., 15 Wall St., N. Y.

Car Couplings
Auto. Interchangeable Car Coupler Co., San Francisco, Cal.
Drexel Car Coupler Co., Rookery, Chic.
Gould Coupler Co., Buffalo, N. Y.
Hinson Car Coupler Co., Chicago, Ill.
McConway & Torley Co., Pittsburgh, Pa.
McGill Iron Works Co., Peoria, Ill.
St. Louis Car Coupler Co., St. Louis, Mo
Smillie Coupler & Mfg. Co., Newark, N.J.
The Standard Car Coup. Co., Troy, N. Y.
Trojan Car Coupler Co., Troy, N. Y.
Thurmond Car Coup. Co., 80 B'way, N.Y.
Van Dorston Coup. Co., Phila., Pa.

Car Doors
J. A. L. Waddell, Kansas City, Mo.

Car Furnishings
Dayton Mfg. Co., Dayton, O.

Car Heaters
Baker Heater Co., 799 Gr'nwich St., N.Y.
Consol. Car Heating Co., Albany, N. Y.
Gold Car Heat. Co., Frankfort St., N. Y.
Martin A. F. Car-Heat. Co., Dunkirk, N.Y.
Morton Safety Heating Co.
National Car Heating Co., Chicago.
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light Co., 160 B'way, N. Y.

Car Heating Equipment
Stanley G. Flagg & Co., Philadelphia.

Car Machinery
Greenlee Bros. & Co., Chicago.

Car Platform Gates
J. B. Goodwin, 29 B'way, N. Y.

Car Plushes
Sanford Mills, 129 Wash'ton St., Boston.

Car Replacers
Q. & C. Co., Chicago.

Car Seats
Hartford Woven Wire Mattress Co., Hartford, Conn.
Hale & Kilburn Mfg. Co., Phila.

Car Seals
Buffalo Seal & Press Co.., Buffalo, N. Y.

Car Stools
C. B. Hutchin's Sons, Detroit.
Lee Composite Mfg. Co., New York.

Car Upholstering
Knitted Mattress Co., Canton Jct., Mass.

Car Wheel Presses
Tinius Olsen & Co., Philadelphia, Pa.

Car Wheels
Allen Paper Car-Wheel Co., Chicago, Ill.
American Steel Wheel Co., N. Y. City.
Baltimore Car-Wheel Co., Balto., Md.
Barnum & Richardson Mfg. Co., Chic.
Bowler & Co., Cleveland.
Cayuta Wheel & Foundry Co., Sayre, Pa.
Cushion Car Wheel Co., Indianapolis.
Davenport & Fairbairn, Erie, Pa.
Dickson Car Wheel Co., Houston, Tex.
C. G. Eckstein & Co., 52 Liberty St. N.Y.
Jersey City Wheel Fd'y & Mach. Works,
Lima Machine Works, Lima, O.
Lobdell Car-Wheel Co., Wilmington, Del.
Louis. Car-Wheel Co., Louisville, Ky.
N. Y. Car Wheel Works, Buffalo.
Thos. Prosser & Son, 15 Gold street, N.Y.
Ramapo Wheel & F'dry Co., Ramapo, N.Y.
Stand. Steel W'ks, 220 So. 4th St., Phila.
Taylor Iron & Steel Co., High Bridge, N.J.
Washburn Car-Wheel Co., Hartf'd, Conn.
Wason Mfg. Co., Springfield, Mass.
A. Whitney & Sons, Philadelphia, Pa.

Car Window Balance
Caldwell Mfg Co., Rochester, N. Y.
O. K. Gardner, Box 171, Pittsburgh, Pa.

Cattle Guards
Bush Cattle Guard Co., Kalamazoo, Mich
Kalamazoo R. R. Veloc. & Car Co., Kalamazoo, Mich.
National Surface Guard Co., Chicago.
Benj. Wolhaupter, 39-43 Washington St., Chicago, Ill.

Coal Chute
Williams, White & Co., Moline, Ill.

Coal Transferring
C. W. Hunt Co., 45 Broadway, New York.

Consulting Engineers
Thomas Appleton, 505 Rialto Bldg., Chic.
G. Bouscaren, Cincinnati, O.
D. L. Barnes, The Rookery, Chicago.
J. J. R. Croes, 13 William St., N. Y.
S. W. Frescoln, World Bldg., N. Y.
W. C. Foster, 52 Broadway, N. Y.
Geo. L. Fowler, 53 Broadway, N. Y.
Albert Lucius, 71 Broadway, N. Y.
W. B. Parsons, 35 Broadway, N. Y.
Chas. Paine & Sons, 71 Broadway, N. Y.
F. H. Smith, 227 E. German St., Balto., Md.
Von Schon & Garrer, Fredericksb., Va.
J. A. L. Waddell, Kansas City, Mo.
Wilson Bros. & Co., Philadelphia, Pa.

Consulting Electrical Engineers
Sprague, Duncan & Hutchinson, N. Y.

Conveyers
Link Belt Eng. Co., Nicetown, Phila.

Copper
Hendricks Bros., 49 Cliff street, N. Y.

Cordage
Samson Cordage Works, Boston, Mass.

Cranes
Industrial Works, Bay City, Mich,
John N. Poage, Cincinnati, O.
R. D. Wood & Co., Philadelphia, Pa.
Yale & Towne Mfg. Co., Stamford, Conn.

Creosoting
Creosote Lumber & Construction Co.
Pernandina, Fla.
Lehigh Valley Creo. W'ks., P. Amboy, N.J.

Crossings
Fontaine Crossing Co., Detroit, Mich.

Crossing Gates
Bogue & Mills Mfg. Co., Chicago.

Culvert Pipe
Blackmer & Post, St. Louis, Mo.

Draft Rigging
Schoen Mfg. Co., Pittsburgh, Pa.

Drawbar Attachment
Amer. Cent. Draw-Bar Co., Aurora, Ind.
American Steel Wheel Co., N. Y. City.
Butler Drawbar Attach. Co., Cleveland.
Hinson Drawbar Attach. Co., Chicago.

Dredging Machinery
Bucyrus (O.) Steam Shovel & Dredge Co.
San Francisco Bridge Co., California.
Vulcan Iron Works, Chicago.
Vulcan Iron Works, Co., Toledo.

Drop Forgings
Billings & Spencer Co., Hartford, Conn.

Electric Crossing Signal
Electric Supply & Mfg. Co., Cleve'd, O.

Electric Headlights
Nat. Elect. Headlight Co., Indianapolis.

Electric Motors
Thomson-Houston Motor Co., Boston.

Electric Railways
Thomson-Houston Electric Co., Boston.

Elevators
Link Belt Eng. Co., Nicetown, Phila.

Emery Wheels
N. Y. Belt. & Packing Co., 15 Park Row.
Northampton Emery W. Co., Leeds, Mass.
Tanite Co., Stroudsburg, Pa.

Engineering Employment Bureau
Engineer. Employm't Bureau, 8 Granger Block, Syracuse, N. Y.

Engineering Instruments
Chas. H. Brightly, Philadelphia Pa.
Fieller & Brightly Philadelphia, Pa.
C. F. Ketcham & Co., 27 Nassau St., N. Y.
Keuffel & Esser, New York City.
Queen & Co., Philadelphia, Pa.
Young & Sons, Philadelphia, Pa.

Engines
Fishkill Landing Mch. Co., Fishkill, N.Y.
Philadelphia Engineering Wks., Phila.

Excavators
Bucyrus (O.) Steam Shovel & Dredge Co.
Industrial Works, Bay City, Mich.
A. S. Males & Co., Cincinnati, O.
Marion Steam Shovel Co., Marion, O.
Osgood Dredge Company, Albany, N. Y.
J. Souther & Co., Boston, Mass.
Vulcan Iron Works, Chicago.

Explosives
Rendrock Powd. Co., 23 Park Place, N.Y.

Feed-Water Purifier
Field Water Purifier Co., Chicago.

Fences
Barkly & House, Chicago, Ill.

Flexible Shafting
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.

Fluoride
Amer. Fluoride Co., 126 Liberty St., N.Y.

Freight Cars, Second Hand
New York Equip. Co., 15 Wall St., N. Y.

Freight Conveyors
Industrial Works, Bay City, Mich.

Frogs and Crossings
Allentown Rolling Mill, Allentown, Pa.
Cleveland (O.) Frog & Crossing Co.
Elliott Frog & Sw. Co., E. St. Louis, Ill.
Johnston R. R. Frog & Switch Co., Phila.
Pennsylvania Steel Co., Steelton, Pa.
Ramapo Iron Works, Hillburn, N. Y.
Union Switch & Signal Co., Pittsburgh.
Weir Frog Co., Cincinnati, O.

Furnaces
Abendroth & Root M.Co., 28 Cliff St., N.Y.

Gauges (Pressure)
Ashcroft Mfg. Co., 111 Liberty St., N. Y.

Grader, Ditcher & R. R. Builder
F. C. Austin Mfg. Co., Chicago, Ill.

Guarantee Co.
Guarantee Co. of N. A., Montreal.

Hand Cars
The Buda Fdy & Mfg. Co., Harvey, Ill.
Fairbanks, Morse & Co., Chicago.
Kalamazoo (Mich.) R. R. Veloc. Co.
Sheffield Velocipede Car Co., Three Rivers, Mich.

Harbor Works
S. W. Prescolu, World Bldg., N. Y.

Highway Crossing Signals
Electric Supply & Mfg. Co., Cleve'd, O.

Hoisting Engines
Copeland & Bacon, New York City.
Industrial Works, Bay City, Mich.
Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
J. S. Mundy, Newark, N. J.
Vulcan Iron Works Chicago.

Hollow Stay Bolt Iron
Falls Hollow Stay Bolt Co., Cuyahoga Falls, O.

Hydraulic Jacks
Richard Dudgeon, 24 Columbia St., N. Y.
Joseph F. McCoy Co., 26 Warren St., N.Y.
Watson & Stillman, 210 E. 43d St., N. Y.

Hydraulic Machinery
Tinius Olsen & Co., Philadelphia, Pa.
Union Iron Works, San Francisco.
Watson & Stillman, N. Y. City.
R. D. Wood & Co., Philadelphia, Pa.

Injectors
Nathan Mfg. Co., 94 Liberty street, N. Y.
Wm. Sellers & Co., Philadelphia.

Inspectors of Bridges and Ry. Equipment
R. W. Hildreth & Co., 2 Wall St., N. Y.

Insurance
Hart. Steam Boiler Insp. & Ins. Co., Hartford.
Royal Ins. Co., 50 Wall street, N. Y.

Interlocking Switches & Signals
Allentown Rolling Mills, Allentown, Pa.
Hall Signal Co., 50 B'way, N. Y.
Kelsey R. R. Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Union Switch & Signal Co., Pittsburgh.
Wharton R. R. Switch Co., Phila.

Iron—Taylor Yorkshire
B. M. Jones & Co., Boston, Mass.

Iron Work for Contractors
Edge Moor Bridge Wks, Wilmington, Del.
King Bridge Co., Cleveland, O.

Iron & Steel Shipbuilders
Union Iron Works, San Francisco.

Jacks
Fairbanks, Morse & Co., Chicago.
McSherry Mfg. Co., Dayton, O.
Richard Dudgeon, 24 Columbia St., N. Y.
Watson & Stillman, 210 E. 43d St., N. Y.

Journal Bearings
Ajax Metal Co., Philadelphia, Pa.
D. A. Hopkins Mfg. Co., 143 Liberty St., N. Y.
Phosphor-Bronze Smelting Co., Philada.
Paul S. Reeves, Philadelphia, Pa.

Journal Bearings—Tubular
Meneely Bearing Co., W. Troy, N. Y.

Journal-Box Lids
Ramapo (N. Y.) Wheel & F'dry Co.

Lighting
Adams & Westlake Co., Chicago.
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light. Co., 160 B'way,

Link Belting
Link Belt Eng. Co., Nicetown, Phila.

Lock Washers
Nat. Lock Washer Co., Newark N. J.

Locomotives
Baldwin Locomotive Works, Philada.
Brooks Locomotive W'ks, Dunkirk, N.Y.
Cooke Loco. & Mach. Co., Paterson, N.J.
Dickson Mfg. Co., Scranton, Pa.
G. L. Fowler, 53 Broadway, N. Y.
Lima Machine Works, Lima, O.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pittsburgh Loco. & Car W'ks, Pittsburgh.

RAILROAD GAZETTE DIRECTORY CLASSIFIED ADVERTISEMENTS

Locomotives (Continued)
H. K. Porter & Co., Pittsburgh, Pa.
Richmond (Va.) Loco. & Mach. Works.
Rogers Loc. & Mch. Wks., Paterson, N. J.
Schenectady (N. Y.) Loco. Works.
Taite & Carlton, London, Eng.
Wharton R. R. Switch Co., Phila.

Locomotive Boiler Tubes.
Allison Mfg. Co., Philadelphia, Pa.

Locomotive Finishing Varnish
Flood & Conklin, Newark, N. J.

Locomotive Headlights
Adams & Westlake Co., Chicago.
Nat. Elect. Headlight Co., Indianapolis.

Locomotives, Second-Hand
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.

Locomotive Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

Lubricators
American Supply Co., Kansas City, Mo.
Detroit Lubricator Co., Detroit Mich.
Nathan Mfg. Co., 92 Liberty street, N. Y.

Machinists' Tools
Acme Machy. Co., Cleveland, O.
Bement, Miles & Co., Philadelphia, Pa.
Billings & Spencer Co., Hartford, Conn.
E. W. Bliss Co., Brooklyn, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ferracute Machine Co., Bridgeton, N. J.
Gould & Eberhardt, Newark, N. J.
Edw. Harrington, Son & Co., Phila.
Hayes Tool Co., Portland, Me.
Long & Allstatter Co., Hamilton, O.
Manning, Max. & Moore, 111 Liberty St.,
Morse Tw. Dr. & Mach. Co., N. Bed'd, Mass.
Newark Mach. Tool Wks., Newark, N. J.
Niles Tools Works, Hamilton, O.
Pedrick & Ayer, Philadelphia, Pa.
Geo. Place, 120 Broadway, N. Y.
D. Saunders' Sons, Yonkers, N. Y.
Wm. Sellers & Co., Philadelphia.
Stiles & Parker Press Co., Middletown, Conn.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
Universal Radial Drill Co., Cincinnati.
Watson & Stillman, 210 E. 43d St., N. Y.
Wharton R. R. Switch Co., Phila.

Malleable Iron Castings.
National Malleable Castings Co., Cleveland.

Mandrel Rolled Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

Mining Machinery
Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
Union Iron Works, San Francisco.

Mop Wringer
Boston Wringer Co., Boston.

Nut Locks
Amer. Washer & Mfg. Co., Newark, N. J.
Metcalf, Paul & Co., Pittsburgh, Pa.
National Lock Washer Co., Newark.
Ruffner & Dunn, Philadelphia, Pa.
Standard Nut Lock Co., N. Y.

Oil Cans
Adams & Westlake Co., Chicago.
Bryant & Barbey, 178 Summer St., Boston.
H. A. Williams Mfg. Co., Boston.

Oil
Signal Oil Works, Ltd., Franklin, Pa.

Ore Handling Machinery.
King Bridge Co., Cleveland, O.

Packing, Asbestos
H. W. Johns Mfg. Co., N. Y. City.

Packing-Rubber
N. Y. Belting & Pack. Co., N. Y. City.
Peerless Rubber Co., 15 Warren St.

Paint
Andrews Paint & Color Co., 15 Cortlandt Street, N. Y.
F. W. Devoe & Co., Fulton St., N. Y.
Jos. Dixon Crucible Co., Jersey City, N.J.
Nat. Paint Works, Williamsport, Pa.
Standard Paint Co., 2 Liberty St., N. Y.

Patents
Bowson & Howson, 119 So. 4th St., Phila.
Geo. P. Whittlesey, Washington, D. C.

Phosphor-Bronze
Paul S. Reeves, Philadelphia.
Phosphor-Bronze Smelting Co., Phila.

Pile Drivers
Bucyrus (O.) Steam Shovel & Dredge Co.
Industrial Works, Bay City, Mich.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y.
Vulcan Iron Works, Chicago, Ill.

Pipe Cutting & Threading Mach.
D. Saunders' Sons, Yonkers, N. Y.

Pneumatic Foundations
S. W. Frescoln, World Bldg., N. Y.

Portable Drills
Frank Reed, Worcester, Mass.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.

Pressed Steel
Schoen Mfg. Co., Pittsburgh, Pa.

Pumps
Fairbanks, Morse & Co., Chicago.
Laidlaw & Dunn Co., Cincinnati, O.
R. D. Wood & Co., Philadelphia, Pa.
H. R. Worthington, 86 Liberty St., N. Y.

Radial Taps
J. T. Connelly, Milton, Pa.

Rails
American Supply Co., Kansas City, Mo.
Bethlehem Iron Co., 80 Broadway, N. Y.
Cambria Iron Co., Johnstown, Pa.
O. W. Child & Co., 115 Broadway, N. Y.
Geo. A. Evans, 40 and 42 Wall St., N. Y.
Humphreys & Sayce, 10 Wall St., N. Y.
Illinois Steel Co., Chicago, Ill.
A. S. Males & Co., Cincinnati.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pennsylvania Steel Co., 2 Wall St., N. Y.
Robinson & Orr, Pittsburgh, Pa.
A. S. Whitson, 115 Broadway, N. Y.

Rail Fastenings
American Supply Co., Kansas City, Mo.
Cambria Iron Co., Johnstown, Pa.
Fisher Rail-Joint Works, Trenton, N. J.
A. S. Males & Co., Cincinnati.
Metcalf, Paul & Co., Pittsburgh, Pa.
National Lock Washer Co., Newark, N.J.
N. Y. Equipment Co., 15 Wall St., N. Y.
Morris Sellers & Co., Chicago.
Ruffner & Dunn, Philadelphia, Pa.

Rail Saws
Bryant & Barbey, 178 Summer St., Boston.
Industrial Works Bay City, Mich

Railroad and Transp. Lines
Big Four.
Boston & Albany.
Chicago & Alton.
Chicago, Burlington & Quincy.
Chicago, Milwaukee & St. Paul.
Chicago & Northwestern.
Chicago, Rock Isl. & Pacific.
C., H. & D.
Hoosac Tunnel Route.
Illinois Central.
Lehigh Valley R. R.
Michigan Central.
Missouri Pacific.
New York Central & Hudson River.
New York, Lake Erie & Western.
New York & New England R. R.
Pennsylvania.
Stonington Line.

Railroad Printing
C. F. Ketcham & Co., 27 Nassau St., N. Y.

Railroad Supplies
Bryant & Barbey, 79 Milk St., Boston.
Reginald Canning & Co., 115 B'way, N.Y.
O. W. Child & Co., 115 Broadway, N. Y.
Fairbanks, Morse & Co., Chicago.
E. S. Greeley & Co., 7 Dey St., N. Y.
Intern'l Ry. Equipm. & Supply Co., N. Y.
The Johnson R. R. Signal Co., Rahway.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
N. Y. Railway Supply Co., 40 Wall St.
G. D. Peters & Co., London, England.
A. T. Shoemaker, Chicago and N. Y.

Railway Varnishes & Surfacers
Flood & Conklin, Newark, N. J.

Ratchet Drills
Billings & Spencer Co., Hartford, Conn.
Schattler Mfg. Co., Chicago.

Reducing Valves
Curtis Regul. Co., 89 Beverly St., Boston.
Mason Regulator Co., Boston, Mass.

Refined Iron
Falls Hollow Staybolt Co.

Refrigerator Cars
R. M. Pancoast, Camden, N. J.
So. & Pac. Refrigerator Car Co., Chicago.

Refrigerating Machinery
De La Vergne Refrig. Machine Co., N.Y.

Rivets, Slotted
J.A. Thomson Mfg. Co., Waltham, Mass.

Rock Ballast and Rock Breakers
Gates Iron Works, Chicago, Ill.

Rock Drills
Ingersoll-Sergeant Rock Drill Co., N. Y.
Rand Drill Co., 23 Park Place, New York.

Roofing
East. Gran. Roofing Co., Jersey City, N.J.

Roofs
Berlin Iron Bridge Co., E. Berlin, Conn.
King Bridge Co., Cleveland, O.

Rolling Journal Bearings
Meneely Bearing Co., W. Troy, N. Y.

Rolling Stock to Lease
Oliver Adams, 32 Liberty St., N. Y.

Rubber Belting
N. Y. Belting & Pack. Co., 15 Park Row.
Peerless Rubber Co., 15 Warren St.

Safety Valves
Ashton Valve Co., Boston, Mass.

Saw Mills
Richmond (Va.) Loco. & Mach. Wks.

Second-Hand Rolling Stock
A. S. Males & Co., Cincinnati.

Sewer Pipe
Blackmer & Post, St. Louis, Mo.
R. D. Wood & Co., Philadelphia, Pa.

Sewerage
J. J. R. Croes, 12 William St., N. Y.

Shafting
Wm. Sellers & Co., Phila.

Signals.
Hall Signal Co., 50 Broadway, N. Y.
Johnson R. R. Signal Co., Rahway, N. J.
Kelsey R. R. Signal Co., Florence, Mass.
Kinsman Bl'k System Co., 143 Liberty St.
Mozier Safety Signal Co., Galion, O.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Union Switch & Signal Co., Pittsburgh.

Skylights
Valle & Young, 209 No. St., Baltimore, Md.
E. Van Noorden & Co., Boston.

Snow Shovels and Plows
Jull Mfg. Co., Brooklyn.
Leslie Bros. Mfg. Co., Paterson, N. J.

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Morris Sellers & Co., Chicago.

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Pickering Spring Co., Philadelphia.
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Auction Sale of Railroad Cars and Locomotives.

NOTICE IS HEREBY GIVEN that in pursuance of an order of the Circuit Court of the United States for the Southern District of New York, made and entered upon on the fourth day of April, 1892, I, the undersigned, William C. Lane, Receiver of the property of the United States Rolling Stock Company, will sell at public auction, for cash, at the works of the United States Rolling Stock Company, at Hegewisch, Ill., upon the 25th day of April, 1892, at 12 o'clock, noon, the following described rolling stock:

45 Box Cars,
107 Stock Cars,
6 Flat Cars,
80 Coal Cars,
24 Refrigerator Cars, and
2 Locomotives.

On Thursday, the 28th day of April, 1892, at 12 o'clock, noon, at the works of the United States Rolling Stock Company, at Decatur, Ala., the following railroad rolling stock:

50 Gondolas,
3 Box Cars,
28 Refrigerator Cars.

And on Saturday, the 30th day of April, 1892, at the works of the United States Rolling Stock Company at Anniston, Ala., at 12 o'clock noon, the following railroad rolling stock:

32 Flat Cars,
8 Box Cars,
9 Refrigerator Cars.

And on Wednesday, the 4th day of May, 1892, at 12 o'clock noon, at the works of the United States Rolling Stock Company at Urbana, O., the following railroad rolling stock:

1 Refrigerator Car,
12 Box Cars,
11 Flat Cars,
20 Stock Cars.

And on Friday, the 6th day of May, 1892, at 12 o'clock noon, in the yards of the Pennsylvania Railroad Company, at Harrisburg, Pa.,

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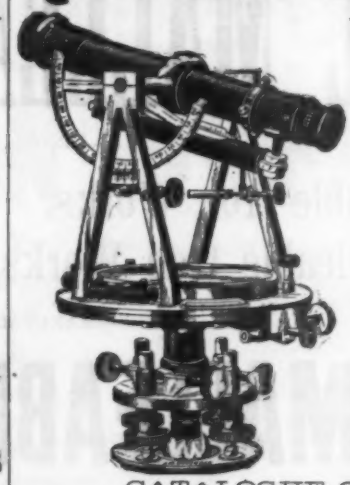

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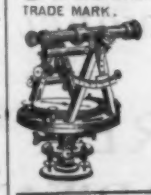

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The Central Trust Company Certificates which are being issued in exchange for the securities deposited under the plan of reorganization **have been listed on the New York Stock Exchange.**

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Copies of the Plan of Reorganization may be had at the office of the Central Trust Company of New York.

NEW YORK, April 7, 1892.

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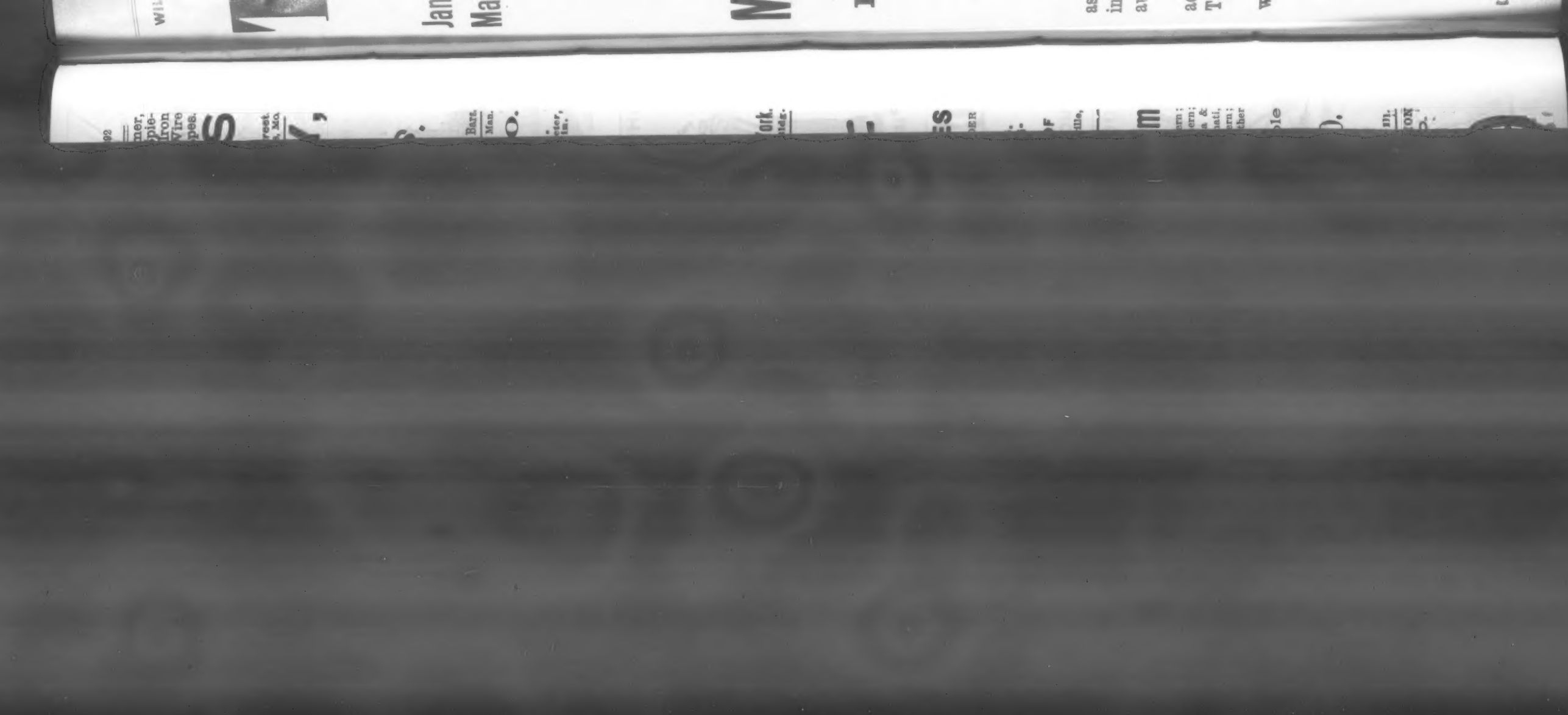

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RAILROAD GAZETTE

FRIDAY, APRIL 8.

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Contributions.

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TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice an editorial in a late issue of one of your contemporaries criticising my article in the *Railroad Gazette* March 25. While thanking the author for the courtesy with which he has treated me in giving me credit for good motives, I still feel impelled to maintain the position I took then.

I think it will be admitted that even where the rod is attached to the end of the car (which is the method most practical and in general use) that it is liable to get out of order; also that where any rod is hung under or partly under the car it is more liable to danger, also that any spring on the inside of the drawhead will get out of order and make the coupler inoperative. In either of the above cases it would be necessary to go in and open the knuckle, and the trainmen *would do it while the train was in motion* if the law did not release the railroad company from suits for damages.

I do not think that the case of the stick in coupling with the link and pin applies to the opening of the knuckle in the M. C. B. type. In the first place no stick is necessary, in the next place if it was it could not be used without laying it down every few minutes. No one who stops to think could blame the men for not using it. They would have to carry it all the time when applying the brakes and also would have to lay it down every time they went in to put in both link and pin, which is often the case and which requires both hands. After a majority of the cars are equipped with the M. C. B. type it will so seldom be necessary to open the knuckle that the question of delay caused by not going in between the cars while they are in motion does not amount to much.

There is another thing that I think has escaped observation and that would cost the railroad companies more for damages and more for loss of life to the men, *i. e.* that either with a spring and an ordinary rod or a rod to push, that stands in front of the car, it is necessary, in order to operate while the car is in motion, that the man should walk backward, making him liable to fall; he is, in fact, more liable than if he ran in hurriedly to open the knuckle.

A law such as I suggested, viz., *making it illegal to go between the cars while they are in motion*, could be made to apply also to coupling air-brake hose. This will be a fruitful source of danger, as the cars are sent together at such speed that, even if the brake is on, a single car will be pushed quite a distance, and thus endanger the brakeman.

I am quite as anxious to save the trainmen as I am to save the companies from suits, yet I still think a law as suggested would be the only remedy.

T. L. MCKEEN.

Surface Cattle Guards.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Knowing that you are interested in track and track appliances I take the liberty of forwarding you a drawing of our new Standard cattle guard, which I believe to be the most effective surface guard in the market today.

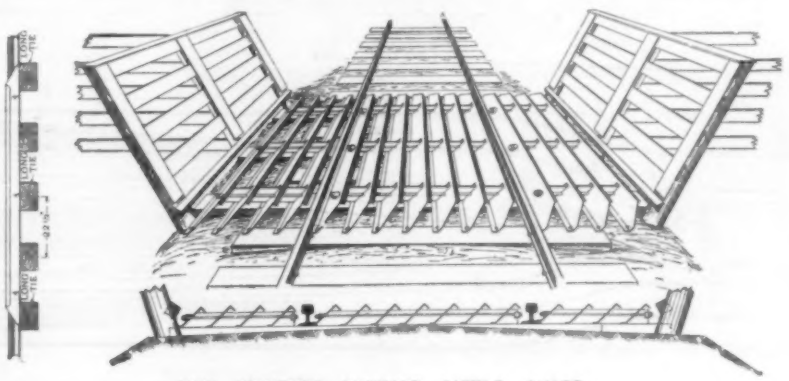
As the old pit guard has so many well known objections, notably the heavy expense liable to be caused and frequently occurring in cases of derailment, it is very rightly being discarded on railroads in this country.

The guard here shown is built in three sections and is composed of angle bars with one long leg. The angle bars are laid parallel with the rails and with the long leg inclined to the ties, in such a manner that one angle bar overhangs the inclined leg of the next. These angle bars or slats are chamfered at their ends so that trailing objects will slide up and over them. They also have a railroad spike hole in each end, in order that each may be firmly spiked to the ties. These slats are held at the right distance apart by spacing plates, which also give them the proper inclination to the ties; through the bars are run steel bolts adjacent to the spacing plates, thus binding each section together. Each section is firmly and securely bound and interlocked together by the spacing plates and bolts with the longitudinal slats, which thus makes each section firm, strong and unyielding. The whole of the guard is made with special machinery designed and manufactured for the special purpose of doing this work, and all parts are interchangeable. The whole of the steel is worked cold in our machinery, which necessitates a high grade of material.

This guard does not act, as do other surface guards, upon the principle of vibratory motion, but upon a much better and more effective principle. When an animal steps on one of these inclined slats its foot slides down till the sharp edge of the angle of the next adjacent slat presses into the tender part of the ankle above the hoof, thus compelling it to withdraw. This is as effective with small animals, such as sheep and hogs, as it is with large stock, and no other surface guard will keep out this small stock.

That you may see how effective this guard is, I will quote a letter recently written to me by a roadmaster of a prominent railroad, who gave this guard a thorough test. He says: "On one side of the guard I placed a pile of hay and stalks and on the other side of the fence and guard I collected about 12 head of cattle of different sizes and ages. I kept the cattle close up to the guard by herding them with eight men for about 30 minutes, and in that time not one of them crossed. One after another they would step on the guard and attempt to cross, and would immediately step back again. We then tried to drive them across, but did not succeed after making repeated attempts. Seeing I could not get them over in this way, I turned the herd, all but four, through the fence to the hay on the inside and allowed them to eat. Again I brought the men around the four remaining cattle and herded them close up to the guard, but could not get them to go over. Finally, I determined to force them over, as they would be forced through a pit guard, just to see what the result would be. One of the most frisky made a lunge and jumped the guard; after some time one other was forced on and floundered across, then another went over much in the same way. Three of them went over under this pressure, but I believe they would have crossed any other guard, pit guard included, under the same test. The last part of this test I do not think was fair, because the stock were absolutely forced across, and it was plain that under ordinary circumstances the stock would not have attempted more than a step on the guard. I believe you have the best surface guard on the market to-day."

This test was much more severe than that made at Indianapolis last fall, in which all of the surface guards then manufactured were tested, and over all of which the cattle readily walked. BENJ. WOLHAUPTER.



THE STANDARD SURFACE CATTLE GUARD.

Block Signaling on the New York Central.

The contracts for erecting block signals throughout the main line of the New York Central, which were briefly noticed in these columns last week, are now being perfected in detail and the company hopes to have all the work done before next winter.

The work between New York and Albany, which is already under way, is expected to be finished before Sept. 1. It has been decided to put in the block system on the line from Buffalo to Suspension Bridge, where there will be 10 sections, in a length of 24 miles, so that when the present season's work is done the entire line from the Grand Central Station, New York City, to Suspension Bridge, via Buffalo, will be operated under the manual block system with Sykes locks. The contract for the automatic signals for the short sections on the freight tracks near the large freight yards have not yet been decided upon.

The automatic pneumatic block system on the Harlem division is to be extended and the contract has been given to the Union Switch & Signal Co. to equip the line from Woodlawn, the present terminus of the pneumatic plant, north 10 miles to White Plains, the northern terminus of the double track on the Harlem Division. A power station will be established at Tuckahoe, four miles north of Woodlawn, and there will be pneumatic interlocking at one or two points, including Tuckahoe, which is the turning point for a number of local passenger trains.

The details of the work between Albany and Buffalo have not yet been fully worked out, but it has been decided to have 93 block sections, and 73 of these will have the overhead bridges for supporting each signal directly over the track which it governs. The bridges are to be built by the Hilton Bridge & Construction Co., of Albany, and will be erected by the road. The trusses of these bridges will be fixed 8 ft. apart, and that will be the width of the towers placed upon them. The towers at the other 20 stations, which are at important yards (Buffalo, Rochester, Lyons, De Witt, Utica, West Albany and other places), will be designed to accommodate interlocking machines for switches. The contract between Poughkeepsie and Albany includes a large amount of interlocked switches as well as signals, the plan being nearly or quite as complete as that south of Poughkeepsie, described in the *Railroad Gazette* of Jan. 1, page 10, and Jan. 15, page 36. Altogether the number of levers thus far contracted for is about 1,740, divided as follows: south of Poughkeepsie, 450; Poughkeepsie to Albany, 490; west of Albany, 800.

A Proposed Lift Bridge at Duluth, Minn.

[WITH AN INSET.]

The question of bridging the ship canal at Duluth has been agitated for a year or two and several designs have been submitted. The canal separates from the main land, Minnesota Point, a tongue of land about three miles long, forming one side of the harbor and with a valuable water front. This land is practically inaccessible now, but with a bridge across the ship canal suitable for railroad and highway purposes it would at once become available for the many business uses of that active and ambitious city. Flat land near the water is unusually scarce in Duluth, and for this reason the point now cut off by the canal has an especial interest in the eyes of the citizens. The design which we illustrate is by Mr. J. A. L. Waddell, of Kansas City, and has been presented to the city officers and the Board of Engineer officers of the United States Army.

This bridge is designed to consist of a simple truss span, 257 ft. long between centres of bearings, so supported and constructed as to allow of being raised vertically to a sufficient height to permit the largest lake vessels to pass unobstructed through the canal, the clear width of which, 250 ft., will not be reduced. The distance from the surface of the water in the canal, at its ordinary stage, to the lowest part of the bridge, when it is raised to its highest position, will be about 140 ft., and the corresponding distance for the lowest position of the structure will be about 7 ft.

At each side of the canal there will be a tower about 195 ft. above the water level, properly stayed, carrying at its top built steel and iron pulleys 15 ft. in diameter; over these pulleys 48 steel wire ropes 1½ in. in diameter will pass; one end of each of these ropes will be attached to an end pin of the truss and the other end to one of the counter-weights, which counter-weights will be so proportioned as to just balance the dead weight of the span. The weight of the cables is counterbalanced by that of the cast iron chains shown.

On account of this counterbalancing, all the work that the operating machinery will have to do will be to overcome the friction, the inertia of the mass, and the varying dead weight of the bridge due to dirt, snow, water, etc. It is intended, however, that the bridge shall at all times be kept as free as practicable from the two former; and the latter can be, to a great extent, compensated by keeping on the ends of the approaches small weights either to attach to the under side of the main counter-weights or to place on the ends of the span, according to whether the latter is heavier or lighter than usual. All moving parts will be so designed as to reduce friction to a minimum.

The power required to raise and lower the bridge will be supplied by two electric motors, either of which will

suffice to operate the machinery; the second one is to act as a reserve. From 20 to 30 H. P. will be required to operate the bridge, according to the intensity of the wind pressure, provided the weight of the structure be balanced. Should the weight not be properly balanced, the power required would be increased or the velocity decreased. There will be a reserve of power in each motor which can be drawn on when the conditions for operating are most unfavorable; and it will be always practicable to throw the reserve motor into gear to meet emergencies.

The electrical energy will be supplied to the motors from the power house of the electric railroad, some 8,000 ft. distant, by means of a special wire; and, to provide for the shutting down of the engines, when the line is not in operation between the hours of midnight and 5 a. m., there will be a storage battery adjacent to the bridge.

The calculated time for raising the bridge to the full height and lowering it again is five minutes; but it is probable that by using some of the surplus energy of the motor, or by employing both motors together, this time could be reduced. It would not be advisable, however, to increase the velocity much above that assumed, which is one foot per second.

The revolutions of the armatures will be communicated by worm gear to a shaft on which are keyed two 5 ft. wheels or drums, having on their peripheries spiral grooves for coiling up the four steel-wire rope cables, each of which is fastened at one end to the top of the tower, at the other to the masonry of the pier, and at the middle to the operating drum. These ropes are kept taut at all times by adjusting rods at the top and bottom. At each end and on the top of the span are two wheels that serve as guides for the cables. The operation of the cables can be understood from the engravings. They cross each other on one-half of the bridge, and run parallel to each other on the other half, so that by turning the operating drums in one direction the bridge will ascend, and by turning it in the other direction it will descend. In case of accident to the machinery the span can be raised or lowered slowly by hand power applied to a capstan that can be placed on the railroad track about midspan.

The approximate weight to be lifted is 950,000 lbs., consequently that of the counter weight must be also 950,000 lbs. As the weight of the wire cables and the cast iron counterbalancing chains is about 62,000 lbs., the total moving weight will be 1,962,000 lbs., or a little less than 1,000 tons.

At top and bottom of the towers there will be hydraulic buffers capable of bringing the structure to rest from its maximum velocity without injurious shock, or some other equally effective method of accomplishing this result will be adopted. After the bridge is down it will be held in place by locking gear attached to the ends of the span, and operated from the machinery house.

The bridge will be steadied while in motion by rollers at top and bottom, pressing against the flush surfaces of the main columns, and providing against excessive friction from both transverse and longitudinal wind pressure. With no wind pressure acting, the rollers for transverse wind loading do not touch the columns, but those for longitudinal loading touch the columns at all times, being pressed against them by springs. This detail is necessitated by the contraction and expansion of the trusses.

There will be brakes on the operating drums for checking the speed and for holding the bridge at any desired height in case of there being unbalanced load sufficiently great to set the bridge in motion. This brake, however, will not ordinarily be required, as the same effect can be obtained by reversing the electric current.

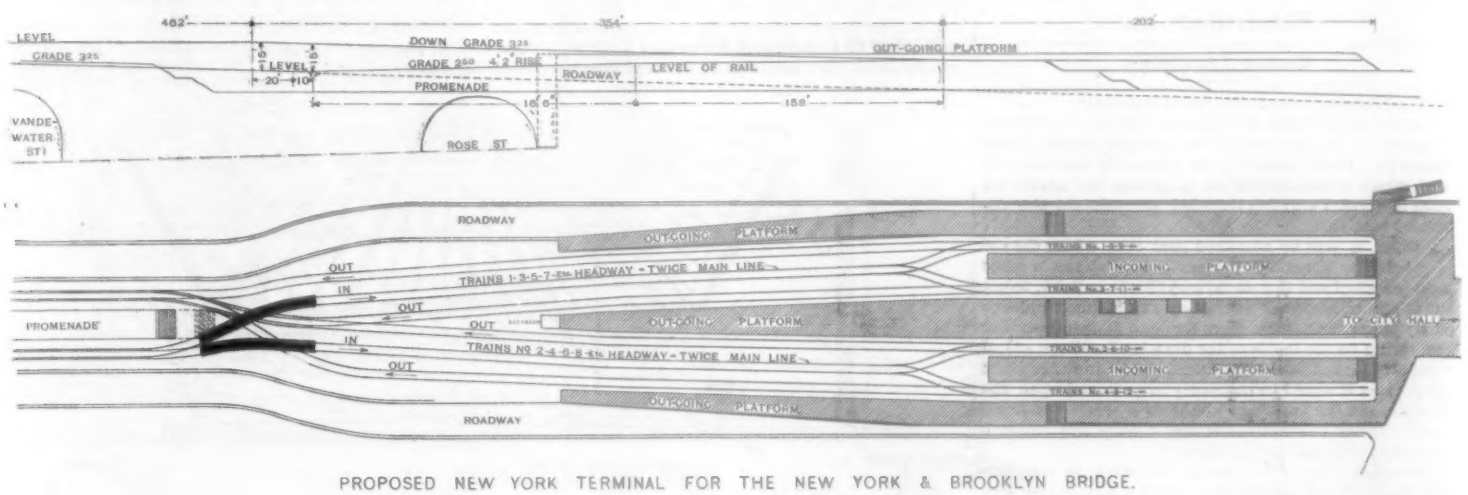
There will be in the machinery house a "peeper" or apparatus that will indicate when the lowest part of the structure has risen high enough to clear the mast of approaching vessels. This peeper is simple in its design and is covered by a patent.

In proportioning the cables that sustain the weight of the bridge, a factor of safety of ten has been adopted. The diameter of the operating cables is ⅝ in., which gives also a large safety factor.

The bridge is designed to carry wagons and street motors outside of the trusses, and railroad trains and pedestrians inside of them; but the pedestrians will have to pass beneath the inclined end posts and diagonally across the wagonways to the sidewalks on the approaches. There can be no serious objection to turning the pedestrian travel across the wagonways, as it must cross them sooner or later in order to reach the sidewalks of the streets.

The distance between the central planes of the trusses will be 25 ft., and the width of the bridge from centre to centre of exterior hand rails about 52 ft. The centre depth of trusses will be 47 ft. The live load will consist of a train composed of two engines followed by cars weighing 3,000 lbs. per lin. ft., according to Waddell's standard train loads, class Z; also a highway live load of 100 lbs. per sq. ft. of floor. The combined load for the trusses, however, will be reduced to 4,200 lbs. per lin. ft.

The stringers and cantilever brackets of the wagon ways will be proportioned to carry electric cars 18 ft. long, each weighing 30,000 lbs., and having two pairs of wheels. The assumed wind pressure is 30 lbs. per sq. ft. on the exposed surface of the structure, including both trusses, when the bridge is closed, reduced to 25 lbs. per sq. ft. for the bridge open.



PROPOSED NEW YORK TERMINAL FOR THE NEW YORK & BROOKLYN BRIDGE.

By A. P. Massey, M. E.

Each tower will consist of two main columns and two rear columns with bracing on all four faces. From the tops of the main columns will extend guys of steel eye bars, attached to anchor piers, and furnished with adjustments. The wind pressure is assumed to divide equally between the windward guy and the bracing between main columns. Near the top of the tower are two girders to support a timber platform, which will carry the counterweights until the bridge is swung, and which will serve afterward to support said weights when the main cables are being adjusted or replaced. The counterweights will consist of masses of cast iron 10 in. wide, 12 in. high and 10 ft. long, strung on wrought iron rods that attach by rockers to the cables above.

All metal in the structure is to be steel except for adjustable members, which are to be of wrought iron, and portions of the machinery and the counterweights, which are to be of cast iron. The sub-structure will consist of masonry piers resting on the foundations.

New York Terminal Plan for the Brooklyn Bridge.

Mr. A. P. Massey has submitted to the New York and Brooklyn Bridge trustees a plan for increasing the capacity of the New York terminal and dispensing with switching engines. It is designed to use gauntleted tracks and to occupy the same ground area as in the adopted plan.

A study of the accompanying drawing shows that the chief improvement consists in the avoidance of grade crossing at the principal cross-over of incoming and outgoing tracks. There is a 3¼ per cent. grade at this point, and Mr. Massey proposes that, from a point 462 ft. east of the cross-over, the incoming track shall maintain a level grade, so as to pass 15 ft. above the outgoing track, and then resume the 3¼ per cent. descending grade, 354 ft., to a level track at the incoming platform.

After the cars are emptied they are shifted to the outgoing platform on a level track. After loading, they descend 4 ft. 2 ins. to the present grade of the outgoing tracks at the point where the present grade and level meet. Here they pass under the incoming tracks and proceed on the present track to Brooklyn.

The incoming tracks are divided into two separate tracks near the place where they cross over the outgoing tracks. These two branches are further divided before reaching the incoming platforms, so that trains may be unloaded and shifted without danger from following trains.

From the incoming platforms the trains are to be shifted direct to the outgoing platforms, where they may be loaded entirely out of the way of any incoming train.

Auxiliary cables run by a separate engine could be used for shifting at both incoming and outgoing platforms. They could push the trains by a dummy attached to the cable, and would not need to use the grips on the cars. Elevators might be put in at Rose street, as in the adopted plan.

Mr. Massey's plan is apparently capable of handling trains as fast as it is possible to run them on the main line, and in case of delay, it allows for storing twelve 4-car trains without occupying either main track. It delivers the incoming passengers at the Park Row line, on separate platforms for successive train loads.

Outgoing passengers on reaching the station would be distributed on broad platforms having a total width of 44 ft., four feet above the present, instead of being crowded through a single stairway 12 ft. wide, and up one more story in height, as in the adopted plan.

Two trains would always be at the loading platforms, so that passengers could go aboard, and there need be no interval to crowd the platforms.

Assuming that the shortest safe headway on the main line is thirty seconds, each train would have thirty-five seconds to unload, 35 seconds to shift (only one movement being required), and eighty seconds to load.

Incoming trains could maintain their full speed until they had left the main track, and would then have 60 seconds intervals; they could, therefore, be retarded, and stopped without danger from following trains. In the adopted plan there would be great danger where one train would have to begin to stop on the main line with another train only 20 seconds (less than two car lengths behind it.

With gauntleted tracks the cars would meet no switch until the speed was but four or five miles per hour, and there was one minute headway.

The tracks on the structure over Park Row would be removed, leaving a broad thoroughfare to the Elevated Railroad and the City Hall Park, and the switching engines with their smoke and noise would be dispensed with. It is estimated that, as compared with the adopted plan, there would be a saving of about $100,000, while the capacity would be twice as great.

Boston Rapid Transit.

The joint commission appointed by the Governor of Massachusetts and the Mayor of Boston, known as the Rapid Transit Commission, has this week submitted its report, the majority approving of the plans of the Advisory Board of Consulting Engineers, consisting of Theodore Cooper, A. Fteley and Frederic P. Stearns. The estimated cost of 13.49 miles of road, including the subway under the Common, Tremont street and Scollay Square, is $9,000,000; equipment, $1,000,000; land, $5,133,000; total, $15,133,000. The substance of the report of the advisory board of engineers is abstracted and condensed as follows:

GENERAL CONDITIONS.

An unusually large proportion of those who do business in the city live in suburbs, which have developed somewhat equally in all directions except easterly—occupying about three-quarters of a circle having its centre in the heart of the city. During the year ending June 30, 1891, the steam roads carried to and from Boston 51,294,903 passengers—about half at the four stations grouped together at the north end, and about half at the four southerly stations not so grouped. The West End Street Railway Company, which controls nearly all the street car lines, carried 119,264,401 passengers during the year ending Sept. 30, 1891.

Although the street railway traffic radiates in all directions from the city, yet the presence of the harbor on the east and the Charles River estuary on the west

forces most of it to come into the business district from its northerly and southerly ends and to pass through it in a northerly and southerly direction. The only thoroughfares leading directly through the business district in this direction are Tremont and Washington streets. On the west of these streets, travel is either prevented or very much restricted by the Common and the heavy grades of Beacon Hill, while on the east the indirectness and lack of continuity of the streets prevented through travel in this direction, until it was forced upon these easterly streets by the blockades in the main thoroughfares. These two main thoroughfares have in the past been used by nearly all lines of street railway, and are now so used, up to the limit of their capacity. They are also centrally located with regard to the steam railroad stations. As a result, this portion of the business district has been a favorite one for retail stores of nearly all kinds, and for theatres and hotels. The great concentration of traffic in this section of the city, due to the various causes above enumerated, together with the narrowness of the streets and sidewalks, has caused all movement within this district, whether on foot or in vehicles, to be sluggish and practically at its maximum development, unless relief is obtained by some new methods.

The problems to be solved as related to rapid transit for the city of Boston and its suburbs are, therefore:

1st. To devise some method which will relieve the congestion of the overcrowded thoroughfares in the central portion of the city.

2d. To furnish a more ready passage from the several suburbs to the business centres of the city.

3d. To furnish a means for distributing the passengers brought in at the several railroad stations, and for transferring them from one station to another.

THE CIRCUIT AND RADIAL SYSTEM.

The board recommends a radial system, shown on the map, connected with a central circuit for the distributing part of the system in the central part of the city, connecting the present railroad stations and following as close to the borders of the present congested business district as a due consideration of the local circumstances and the injury to property will permit. The final selection of a route is not attempted by the advisory board.

The radial lines contemplated extend to South Boston, Roxbury, Cambridge, Charlestown and to East Boston and Chelsea ferries. An elevated road is recommended for all parts of the system except where the topographical conditions compel tunneling. The dotted line on the map shows where tunneling is thought to be necessary. The structure should be strong enough for the heavier class of suburban locomotives. The system consists of about thirteen and a half miles of double-track railroad, viz.:

Circuit	3.30 miles.
Charlestown line	1.75 "
South Boston line	2.53 "
Roxbury line	2.05 "
Cambridge line	3.30 "
East Boston branch	0.49 "
	13.42 "

OPERATION.

The system, as proposed, may be operated in several general ways, viz.:

1st. By running a certain number of trains continuously around the circuit in opposite directions upon the two tracks for the accommodation of the local traffic within the limits of the circuit.

2d. By running other trains from the several radial lines around the circuit in either direction and out again over the same radial line.

3d. By running certain trains from the several radial lines partially around the circuit in either direction and out over other radial lines.

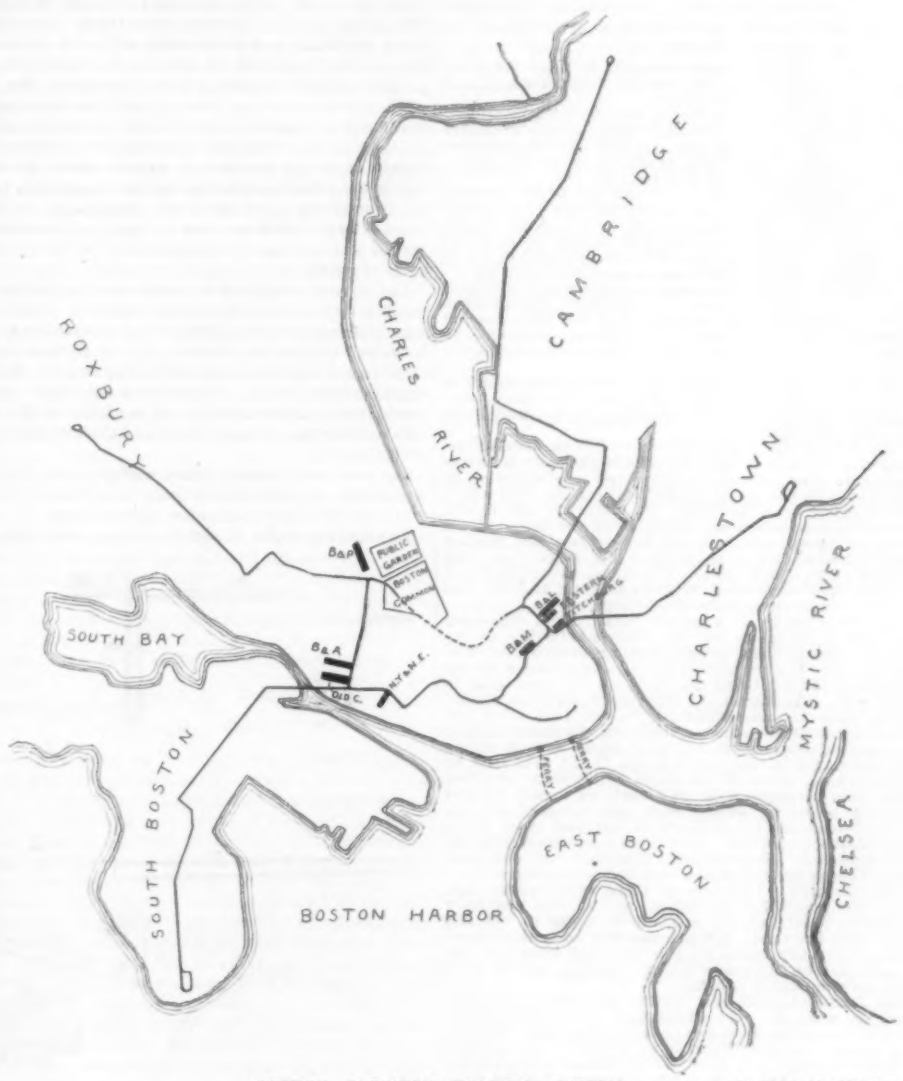
The circuit is estimated capable of handling 500,000 passengers a day. Sixty per cent. of the passengers on the circuit are estimated to come from the radial lines. The radial lines should therefore be equipped to handle 300,000 people a day. For the above purposes the estimated equipment is 110 locomotives and 500 cars, and the estimated annual expenses for a maximum capacity of 500,000 passengers a day are:

Maintenance of way and structure	$107,360
Repairs and renewals of locomotives, etc	110,000
Repairs and renewals of cars, etc	170,000
Wages of guards and conductors	325,000
Wages of engineers and firemen	264,000
Fuel, oil, waste and water	385,000
Operating stations	218,000
Flagmen and switchmen	157,685
General expenses	490,000
Total operating expenses	$2,257,045
Add for taxes	250,000
Total expenses	$2,507,045

The engineers expect, "within a reasonable time" after completion, a traffic of 100,000 passengers a day, and estimate the operating expenses for handling this number as follows:

Maintenance of way and structure	$16,372
Repairs and renewals of locomotives, etc	23,760
Repairs and renewals of cars, etc	29,960
Wages of guards and conductors	100,580
Wages of Engineers and firemen	171,000
Fuel, oil, waste and water	217,800
Operating stations	170,400
Flagmen and switchmen	64,416
General expenses	74,000
Operating expenses	$868,288
Taxes	200,000
Total expenses	1,068,288

For motive power the engineers consider steam locomotives only. "While better methods of operating, avoiding the inconvenience and objections due to the use of steam locomotives, will be developed in the future, we cannot recommend the restriction of the system to any motive power, the success of which is dependent upon future developments. The use of the newer methods, however, should be made compulsory whenever they have shown themselves to be practicable and sufficiently economical to justify their use."



BOSTON ELEVATED RAILROAD SYSTEM. [The Right of the Sketch is North, the Left South.]

The Commission's Proposed Location.

M. C. B. Interchange Rules.

DISCUSSION AT WESTERN RAILWAY CLUB.

The latter part of the meeting of March 15 was given to the report of the Committee on Revision of Code of Rules of Interchange, adopted by the Master Car Builders' Association, in June, 1891, which was read by Mr. J. N. Barr, Chairman. It is given below, and after each recommendation is given, in parenthesis, the action of the Club in regard to it.

Your Committee begs leave to report as follows:

Rule 3 provides that cars may be refused for certain defects: In enumerating these defects there is no provision made for defective axles, except in Sections N, O, and P. In addition to those enumerated, there are two defects in axles, the formation of seams on account of badly welded material, and the destruction of the fillet at the inside of the journal. If this fillet is cut to a sharp corner, the axle is exceedingly liable to break and should be scraped. We, therefore, recommend that in Rule 3, Section O, a clause be added providing for cases in which axles have bad seams, or which have the inside fillet worn to a sharp corner. (Approved.)

In Section "S," Rule 3, "Brakes in bad order," there are 23 conditions which must be complied with. These 23 conditions should be omitted and the following substituted therefor: "Brakes should be considered in bad order unless all parts are sound, in good condition, properly secured and in good working order, with brake shoes at least ⅝ in. thick at the centre, and with all attachments at least 2½ in. above the top of the rail. (Approved.)

In Section "T" of Rule 3, "Steps, ladders, or running boards in bad order or insecurely fastened," omit the two explanatory sections, as they simply reiterate what is said above. (Approved.)

In Section "U," "Drawbars and attachments in bad order;" omit the nine conditions, which are merely explanatory. (Approved.)

Rule 3, Sections Y-2, Y-3, Y-4, Y-5 and Y-6 do not read properly when considered in connection with Rule 3, and the wording should be modified. (Approved.)

A careful reconsideration of Rule 8 is recommended, the committee not feeling prepared at present to make specific recommendations. (Discussion of the rule led to a recommendation to strike out clauses "b" and "c".)

In Rule 9, under the head of axles, Section "B," which now reads "Axles bent or broken, or with collars worn off under fair usage," should be modified so as to read "Axles bent or broken with collars worn off, fillet at inside of journal worn away or seamy journals." (Approved.)

Under Rule 12 it is recommended that the following be adopted as the prices of wheels and axles:

	New.	2d Hand.	Scrap.
One 36-inch wheel	$12.00	$7.00	$5.00
One 33-inch wheel	9.00	6.00	4.50
One 30-inch wheel (or less)	7.50	5.50	4.00
One axle, 60,000 lbs.	10.00	6.00	4.00
One axle, 40,000 lbs.	8.00	5.00	3.50

(Approved.)

Under Rule 26 it is recommended that the charge for steel castings be modified. That the prices be made for drawbars of M. C. B. make, and that a credit be made for good M. C. B. drawbars which are removed on account of not being standard to the car. These drawbars, when removed and in good condition, should not be credited merely at the price of malleable iron scrap. (Approved.)

Rule 30 should be so modified as to authorize the Arbitration Committee or Committee on Revision of Rules, to decide on the basis of equity as well as under the rules. (Approved.) A rule should be introduced requiring that no bill shall be made on a bad order card unless the repairs are actually made. (Approved.)

A careful consideration of the question of doing partial repairs on a bad order card should be considered, and a mode of procedure be definitely settled upon. (Discussed, but no action taken.)

A rule should be inserted requiring that old defects shall not be carded for, except by the owners of the car. This is perfectly equitable. The card seems to have degenerated into a means of making roads chargeable for many defects for which they are evidently in no way responsible. (No action taken.)

The committee gives a list of the labor charges for performing various pieces of work of frequent occurrence with the recommendation that a uniform practice in charges for labor be adopted.

	hours.
1 Draft sill	36
2 Draft sills	42
2 Intermediate sills	35
1 Intermediate and 1 draft sill	41
2 Intermediate and 2 draft sills	47
1 Intermediate sill	20
1 Side or intermediate sill spliced	18
1 End sill	(1) 2
1 Draft timber	10
2 Draft timbers	14
1 Cross tie timber	8
1 End post	10
2 End posts	15
1 Corner or side post	7
1 Swing bolster	8
1 Swing plank	5
1 End plate	10
1 Draw bar	2
1 Door stop side	2

Two cents a square foot for all sheeting, lining and roofing. One cent a square foot for roofing. Three-fourths cent a square foot for paint and nails. (Action deferred until April meeting.)

The report was discussed by sections, and the clause in regard to axles without fillets at inner end of journal or with seams, was first taken up.

President PECK thought it would be hard for an inspector to crawl under the car and look for seams, and the rule would not be observed.

Mr. BARR: The clause simply says cars may be refused for certain defects. It probably would not be a matter of inspection as long as the car was running satisfactorily, but cases might arise in changing wheels, and it would be a just cause for rejecting the car.

Mr. TOWNSEND: If we throw out all axles that are getting sharp in the corner, nearly half the axles would have to go. The tendency is to get square in the corner. There are too many rules, and they should be modified by doing away with one-half of them, and then doing by our neighbor as we would like to have him do by us.

Mr. BARR: If Mr. Townsend removes a pair of wheels and an axle, he makes a bill for the job. The question now is whether he will be justified, if the axle has the fillet worn to a sharp corner, in crediting that axle as scrap or as a second-hand axle. (Recommendation approved.)

President PECK: There ought to be a provision in Rule 8 for springs. Some companies buy very poor springs. If they were made responsible they would employ a little better material.

Mr. BARR: The committee was not unanimous; the majority favored letting the rule be the same as it was last year. The clerical labor involved in attempting to carry out this rule has doubled in billing for brakeshoes and journal bearings worn out, while no one is any better off than before the adoption of the rule. If we were to investigate bills for brakeshoes and journal bearings worn out, we should find that we receive about as many bills as we make. One official will charge half an hour for changing and another an hour, and the one is best off who charges the most labor.

Prssident PECK: It does not make much difference with journal bearings, but the clauses referring to the spring plank and the springs should remain in the rule. The car may be very heavily loaded at the time a spring breaks, without it being the fault of the road that is pulling it. The Master Car Builders' Association should state what an overloaded car is, and just what per cent. of its capacity can be permitted. In discussing the recommendation that no bill be made on a card unless the repairs are actually made, Mr. BARR said that he knew of cases in which bad order cards were removed from cars scrapped and bills made on them. He was recently asked by parties who had wrecked and destroyed some cars for duplicate of the bad order cards that had been on them. On motion the recommendation was approved. The next point discussed was the question of doing partial repairs on a bad order card.

Mr. TOWNSEND had two or three cases where cars have been carded for the defects and it was necessary that some repairs should be made in order to get the cars out of the yard. His practice was to make the repairs, leave the cards on the car, and then tell the owners that he had made certain repairs and ask for a card covering those defects.

Mr. BARR thought Mr. Townsend's practice would form the basis of a very satisfactory rule. If there are partial repairs made on a car of a certain road, the person making the repairs should be authorized to request a card covering those defects. At the same time, if the car goes to the owning road and they carry out the process of estimating the repairs and then making them when it is convenient and making a bill of the estimated repairs, there would be two bills made for the same thing.

Concerning lost defect cards Mr. TOWNSEND said that a great many cards were pulled off by boys. He did not see why duplicates should not be issued. Each is marked duplicate.

Concerning the figures proposed for labor Mr. BARR asked to have the discussion postponed until the next meeting when each member could get from the shops figures for the actual cost of different kinds of work, and see how they agree with the figures suggested by the committee. This was agreed upon and the meeting adjourned.

Johnstone's Valve Gear for Double Bogie Locomotive.

The connection between the driving wheels and the crosshead is more clearly shown in the illustrations given with this than in those before published (*Railroad Gazette*, March 25), and we give herewith a full description of this gear, sent us by the designer, Mr. F. W. Johnstone, Superintendent of Motive Power and Machinery of the Mexican Central road.

The action of the rocking levers is such as to admit of the drivers advancing or receding in adjusting themselves to curves without affecting the travel of piston and crosshead, and such that the length of the connecting rod is constant, one end being solid and the other being fitted with strap and brass in the usual manner. The lever, 50, which is attached to the crosshead is pivoted in the centre, and on straight track remains in a perpendicular position, moving with the crosshead 24 in. in its stroke. When the drivers set themselves to a curve this lever inclines forward or back, as the case may be, remaining in that position until the engine runs off the curve or the radius of the curve changes.

The fixed fulcrum lever, 54, rocks in boxes attached to the guides and main carrying frame; the upper end of this rocking lever is attached to the upper end of the crosshead lever, 50, by means of the rod, 53, while the lower end carries connecting rod, 60, which couples to the pin on return crank, as shown.

The action of lever and rod attachment is as follows:

Assuming the pressure on pistons to be 20,000 lbs., tending to move them toward the rear end of the cylinder, such pressure will be divided by the crosshead lever, 50; 10,000 lbs. acting on rod 59, to rotate the drivers, and 10,000 lbs. on the upper tension rod 53, and fixed fulcrum lever, 54. The upper arm of the lever being to the lower arm as 1 to 1.2, a pull of 8,300 lbs. will be exerted by main rod 60 to revolve the drivers, but as the crank arm of main pin-carrying rod, 59, is to the crank arm of pin-carrying rod 60, as 1 to 1.2, the 8,300 lbs. pull of rod 60 will be equal to the 10,000 lbs. push of rod 59, to rotate the drivers. It is of greater importance, however, that the centre of pin carrying main rod 59 is nearer the centre line of the driving wheel frame than pin-carrying rod 60, the proportion being as 1 to 1.2. In curving, the two main rods will be advanced or receded in this proportion, that is, main rod 59, is advanced one inch, while rod 50 advances 1.2 ins.; it will be seen that the lower end of crosshead lever 50, will be moved ahead 1 in., and as the crosshead must not be disturbed, the upper end of this lever will be moved back 1 in.; carrying the upper end of the fixed fulcrum lever 1 in. to the left; but as the upper end of this lever is to the lower end as 1 to 1.2, the lower end will move to the right 1.2 ins., or just enough to accommodate the forward movement of rod 60.

Again, as the centre of main pin carrying back end of rod 60 is further from the centre of driving wheel truck than main pin carrying rod 59, in the proportion of 1.2 to 1, the pull of 8,300 lbs. exerted by rod 60 will be just equal to the 10,000 lbs. push exerted by rod 53, and the opposing forces will be brought into the same vertical plane, thereby counteracting any tendency of the main rods to force the driving wheels and their frames out of normal position.

The valve movement is taken entirely from the two crossheads—no eccentrics or links being used.

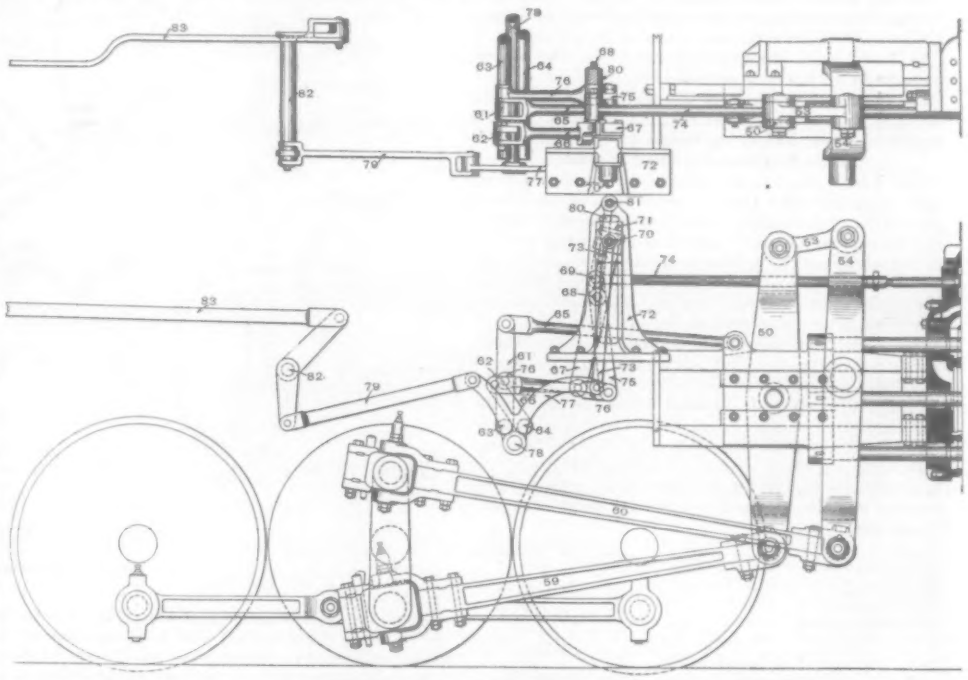
The action of this mechanism is as follows:

Two rocking shafts, 63 and 64, extend across from one side of the engine to the other; on the right side of the engine, shaft 63 has an arm, 61, while on the left side it has an arm of same dimensions as arm 62; and in like manner shaft 64 having arm 62 on the right side has a long arm like 61 on the left side of the engine. Arm 61 is connected to right crosshead by rod 65, and gives the full stroke motion to the valve on the left side of engine. In like manner, the left crosshead by a similar connection with shaft 64 gives full travel of valve on the right side by means of rod 66, which connects with the lower end of full stroke lever 67.

The motion as shown in the diagram, is in full stroke to go ahead, and lever 67 has as a fixed fulcrum the pin 70. At a point on lever 67 the pin 68 forms a fulcrum for the lead and lap lever 75, the lower end of which is connected to the right hand crosshead by rod 76 through lever 61 and rod 65, while the upper end is connected to the end of valve rod 74 by pin 69. These levers and the valve rod are supported by hanger 80, which swings on bolt 81, the lower end connected with pin 68.

The right valve, as before stated, gets its full travel from the left crosshead. The left crosshead is in its full back position throwing arm 62, rod 66, and lower end of lever 67, in position as shown. With pin 60 as a fulcrum pin 68 is moved out of centre, and as the right crosshead is in its central point of stroke, the lower end of lever 75 is held in place by rod 76 and its upper end is carried by pin 68. Its extreme upper end, with pin 69, carries valve rod 74 and the valve to its extreme motion on valve seat. To cut off at any point in go-ahead motion, the block 71 is moved down the slot in casting 72, by means of rod 73, which connects pin 70 with arm 77 of reversing shaft 78; this in turn is actuated by reach rod 79, intermediate reversing shaft 82 and reach rod 83, which is connected to the reverse lever in the cab. It will be seen that as block 71 is lowered the leverage between the point 68 and 70 is shortened, the end of pin 70, which embraces lever 67, sliding down over the lever and drawing its upper end forward; therefore, the more block 71 is moved the less will be the travel of pin 68 and consequently the less will be the travel of valve and the sooner will it cut off in the stroke of the piston. Should block 71 be lowered until pin 70 coincides with pin 68, the motion of lever 67 due to the left crosshead will have no effect on the valve. But under these conditions the valve must have a movement equal to its lap and lead, and this it gets from the right hand crosshead through lever 75 and rod 76, with pin 68 as a fulcrum. To reverse the motion, block 71 is moved to a point below pin 68. The lead is constant at all points of cut-off.

The object of the intermediate reversing shaft 82 is to regulate the amount of motion given block 71 on either end of the engine, one engine always being in the back motion while the other is in the go-ahead motion; and as the movement of block 71 from full stroke to central position, where pin 70 coincides with pin 68, is greater for the go-ahead than for the back motion, these intermediate reversing shafts and arms are introduced to accelerate the motion of block 71 on the end of the engine that is in go-ahead motion and retard it on the end that is in back motion.



VALVE GEAR OF JOHNSTONE'S DOUBLE BOGIE COMPOUND LOCOMOTIVE.

Specifications for Lubricating Oils for the Prussian State Railroads.

In November, 1890, a set of standard specifications for lubricating oils was adopted for the Prussian state railroad system. After a year's trial, however, they were found unsatisfactory and were modified to read as follows:

Characteristics.—The mineral oils used for lubricating parts of rolling stock, steam engines and machinery are to be delivered as "winter oil" and "summer oil," and satisfy the following conditions:

At a temperature of 68 degrees Fahr. the oil must possess a specific gravity not less than 0.900 and not more than 0.925, as well as a viscosity lying between the following limits at the temperature indicated:

	Degrees Fahrenheit.			
Temperature	68	86	104	122
Upper limit	45	20	12	9
Lower limit	25	12	8	6

If heated to 320 degrees Fahr., it must not give off inflammable vapors. The summer oil must flow at 23 degrees Fahr. and the winter oil at 5 degrees., *i. e.*, it must rise at least 0.39 of an inch in a minute in a glass tube of 0.24 of an inch diameter when subject to the constant pressure of a column of water 1.97 in. in height. The oil must be free from water and acids, the odor must not be strong, and it must completely dissolve in petroleum benzine of 0.67 to 0.7 specific gravity. It must not contain impurities, and must leave no residue. If left exposed in a thin layer to the action of the air it must not harden into a pitchy or varnish-like film.

Samples.—Before the expiration of the time set for receiving proposals, samples of the oil must be sent, prepaid, in clean, transparent glass flasks holding 2.113 pints to the Testing Bureau of the Imperial Railroad Directors. No payment will be made for these samples, nor will any part of them be returned. They will be retained for use in disputes concerning the quality of future deliveries of oil, which must correspond with the samples.

Tests.—The viscosity is to be determined by a standardized Engler viscosimeter, and referred to distilled water at 68 degrees Fahr. The flashing point is to be determined by the apparatus described below. The oil must be warmed in a porcelain dish 1.6 in. high and 1.6 in. in diameter, filled to within 0.39 of an inch of the top, and placed in a sand bath. The vapor is to be ignited by a gas flame, issuing from a jet making a right angle with the rubber tube through which the gas is supplied. The burner is to be contracted and the gas supplied in such a manner that the flame is 0.39 of an inch long. The

test for fluidity at low temperatures is to be made with oil that has stood undisturbed for at least one hour at the temperature at which the test is to be made. For this purpose it is to be placed in a glass tube, graduated to centimeters, surrounded by a refrigerating mixture maintaining the proper degree of cold. The test must be made, without removing the tube from the mixture, by means of the apparatus described below. Only tests with such apparatus are to be made in investigating the quality of the oil delivered.

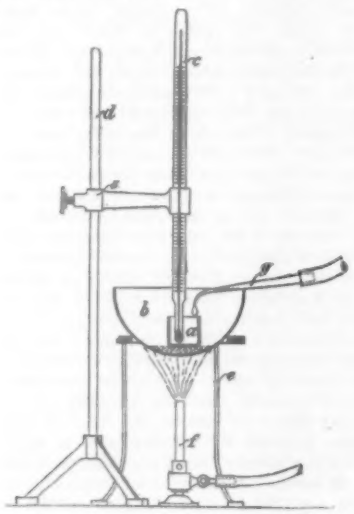


Fig. 1.

Determination of the Flashing Point.—In fig. 1 *a* is the cylindrical glazed porcelain dish, 1.6 in. high and 1.6 in. in diameter, in which the oil is placed; *b* is a hemispherical sand bath 7.2 in. in diameter and filled to a depth of 0.6 of an inch with fine sand; *c* is a thermometer registering between 212 degrees and 396 degrees Fahr.; *d* is a movable clip for holding this thermometer; *e* is a tripod for holding the bath; *f* is a Bunsen burner for heating the sand bath, and *g* is a gas jet. The porcelain dish is filled to within 0.39 of an inch of the top and then placed on top of the sand, not imbedded in it. The thermometer is placed so that the bulb is entirely covered by the oil, which is protected from currents of air by the sides of the iron dish.

The temperature is to be gradually raised from 212 degrees, so that no overheating can occur in any part of the oil. When the temperature has been reached at which it must be tested, the 0.39-in. flame is to be turned on, which is done by letting the jet slowly slide over the edge of the iron dish. The flame is to be allowed to stream through the vapor arising from the porcelain dish for 4 seconds., without, however, touching the surface of the oil or the edge of the dish. These flame tests must begin as soon as the oil reaches a temperature of 248 degrees Fahr., and repeated with every rise of 9 degrees until 298 degrees is reached, when they are to be repeated with each rise of 1.8 degrees. The temperature is to be continued until a flash or feeble explosion takes place when the flame is adjusted.

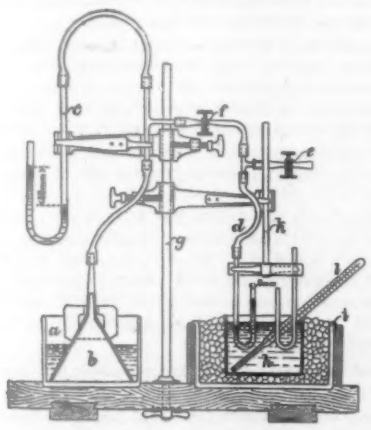


Fig. 2.

Apparatus for Determining the Low Temperatures.—Fig. 2.—This consists of an apparatus for maintaining a constant water column, cut fig. 2, 1.97 in. high, and for reducing the temperature to a definite point. In a glass beaker *a* an inverted glass funnel *b* is placed as indicated. This is connected by rubber tubing and a *T* with a manometer tube, *c*, supported by an arm from the standard, *g*. When water is poured into the tube, *c*, and the beaker, *a*, the pressure of the air in the funnel, *b*, will be indicated by the difference in level of the water in the two legs of the manometer tube, *c*. This pressure can be transmitted through the rubber tube, *d*, by opening the clip, *f*, and in this manner a pressure of 1.97 in. of water can be readily maintained in the glass containing the oil to be tested. The tube *d* carries a *T* connecting with a short piece of rubber tube provided with a clip, *e*, which is kept open in order that no pressure may come upon the oil until the tests begin. The oil is contained in a *U* tube, 0.24 of an inch in diameter, and graduated to centimetres. This tube is placed in beaker *h*, filled with brine, and surrounded by a mixture of ice and coarse salt, contained in the earthenware dish, *i*.

In order to conduct more than one test at a time four oil glasses are attached to the tube holder *k*, from which they can be easily detached. The thermometer *l* lies in the brine and shows its temperature and consequently that of the oil. The tubes are filled with oil to a depth of 1.2 in., and as soon as the proper temperature, 23 degrees Fahr. for summer and 5 degrees for winter oils, is indicated by the thermometer in the brine, they are inserted in this liquid until the level of the oil is 0.39 of an inch below that of the brine. After the expiration of an hour the tube *d* of the pressure apparatus, which is to be ready for immediate use, is attached to an oil tube, and the clip *e*, *previously open*, is closed, and the clip *f* is opened. The time it requires the oil in the open arm of the manometer tube to rise 0.39 of an inch is noted; if a minute or less the oil is satisfactory. After closing the clip *f* and opening that at *e*, the tube *d* can be removed and the next sample tested.

The refrigerating mixture, consisting of one part of coarse salt and two parts of pounded ice, produces a lower temperature than 5 degrees Fahr. To obtain a constant temperature of 23 degrees a solution of 13 parts of nitrate of potassium and 3.3 parts of table salt in 100 parts of water must be used, while for 5 degrees a solution of 25 parts of chloride of ammonium will answer. If pure chemicals cannot be obtained the temperatures may be produced by using a greater or less amount of table salt, which tends to lower the temperature of the solution.

A Tehuantepec Railroad.

A press dispatch from Washington confirms the report that the Mexican government has made a contract with Mr. E. L. Corthell, who is just completing the deepening of Tampico Harbor, Mr. Hampson, of Iowa, and Mr. Stanhope, an English resident of Mexico, to complete the railroad across the Isthmus of Tehuantepec and to open the harbors at each end of the route. This road was commenced about 1881 by a company formed by the late Edward Larned, of New York, with Wm. J. McAlpine as Chief Engineer. Some grading had been done when there was a difficulty with the Mexican government about payments. The concession was declared forfeited and the government undertook to carry out the work itself, but Mr. Larned opposed their efforts to raise capital, and later Captain Eads attempted to raise money to build his ship railroad over the route. So, very little or nothing has been done since the Larned company abandoned the work. Now the Mexican government is said to have $2,000,000 in hand for the work, which will be given to Mr. Corthell and his associates in the way of subsidy, and they are empowered to form a company, etc.

The Tehuantepec route has long been a possibility for interocean transit. Cortez, some 350 years ago, selected it as the most available, and established a large hacienda there, which is said to be in the possession of his descendants yet. In 1850 surveys for a railroad were made over the Isthmus by the late General Barnard, and about 1868 a company was formed in New York to build a canal over the route, but the absence of a good harbor at either end of the route has always hampered the enterprise. This has been unfortunate, as the distance by Tehuantepec is one-third shorter than by Panama, between New York and San Francisco, and about one-half shorter between New Orleans and San Francisco. If Mr. Corthell and his associates can raise money enough to complete the road and improve the harbors they will probably be able to offer a decided competition to the Nicaragua route for passengers and express freights, even with the disadvantage of breaking bulk.

The Congress of Interior Navigation at Paris.

This is the fifth European Congress on International Navigation, the preceding ones having been, in the order named, at Brussels, Vienna, Frankfort-on-Main and at Manchester. The programme commences with an assembly at Lille on the evening of July 18 and an excursion on the 19th and 20th to the canals in the north of France, the Fontinettes lift and the docks of Dunkirk and Calais. On August 21 the sittings of the Congress commence in Paris. There will be four sections, viz.:

1. Construction and maintenance of waterways.
2. Technical working.
3. Commercial working and economical questions.
4. Navigable waterways in their tidal part.

The questions to be discussed are: Consolidation of canal banks, water supply of canals, leakage in canals, reservoirs, stoppages on canals, traction on canals, on canalized rivers, on free rivers, tolls and fees on waterways, conditions of inland ports, respective uses of waterways and railroads in regard to transportation, improvement of tidal rivers and their estuaries. Mr. E. L. Corthell is to read a paper on this last subject, and John Bogart, ex-State Engineer of New York, will read one on traction on canals. The late Col. Wm. E. Merrill was also to have read a paper.

During the congress several short excursions will be organized to the works on the Seine, the Marne and the Paris canals, and at the conclusion of the congress, on July 31, a second excursion will be organized to go to the Canals of the Center, including the canalization of the Saône, straightening the Rhône and the reservoir near St. Etienne, ending at Lyons on the evening of August 3. Members of the congress will bear their own expenses on the excursions, but the French railroads make a reduction of 50 per cent. to the members. An invitation to attend this congress has been extended to the members of the American Society of Civil Engineers, and probably persons who are not members of that society but are interested in the subject could obtain admittance, either through the American Consul in Paris, or by addressing J. Cousté, President of the Chamber of Commerce of Paris, one of the presidents of the organizing committee.

Kentucky Railroad Commissioners' Report.

Messrs. I. A. Spaulding, W. B. Fleming and George M. Adams, Railroad Commissioners of Kentucky, have issued the twelfth annual report of the Commission, which is for the calendar year 1891. The report opens with a history of the Commission and a statement of its powers. One of its duties is to inspect the railroads of the state, making a careful examination of their physical condition, but "the work is attended with inconvenience and personal discomfort," because the fund provided by law is inadequate.

The number of miles of roads in the state is 3,021. About 50 miles of new road were constructed during the year. Earnings for the year ending June 30, 1891, "were greatly in excess of any former year," but it does not appear whether the figures reported are for Kentucky alone or for the whole of the roads reported. The assessment of railroad property for purposes of taxation is one of the most important and difficult duties of the board. The total valuation for the year is $50,211,466, which is about 14 millions greater than the aggregate of the assessments made by the companies themselves. The Commissioners figure out that the capitalization of the roads is $53,129 a mile, and, by assuming that the cost was one-half this, or $26,564 a mile, and again assuming that 70 per cent. of this will be a fair assessment for taxation, they make out that their valuation (or that part of it which is based on mileage) is about $2,000 a mile lower than what could be reasonably claimed as a fair assessment. That is to say, the mileage valuation by the Commissioners is $16,631 a mile, while 70 per cent. of the cost, as above estimated, equals $18,594.

The details of the inspection of the various roads are set forth at considerable length. The Louisville & Jefferson bridge, which is partly completed, is now at a standstill by reason of hard times.

Accident statistics are reported by only 13 roads. On these there were killed 9 passengers, 53 employés and 72 others; and injured, 49 passengers, 745 employés and 103 others. This report, like most of the state reports lately published, gives the data concerning accidents, etc., gathered by the National Convention of Railroad Commissioners. The conclusion is reached that state legislation concerning car couplers may well be held in abeyance; but the Commissioners know of no reason why the law should not hasten the equipment of freight cars with air brakes.

The Commissioners also think that they should be empowered by law to investigate and report upon train accidents. A law requiring equal and separate accommodations on passenger trains for the white and colored races is recommended. There is a long chapter on the principles of public regulation. The legislature is recommended to fix by law a maximum rate for the transportation of coal, subject to modification by the Railroad Commission in exceptional cases, and a coal tariff is submitted in the appendix. Finally the Commissioners make the same request that has been made by the Interstate Commerce Commission, to wit, that the findings of fact in disputes brought before it shall be accepted by the courts, in case of appeal, as conclusive.

Central Railway Club.

At the meeting of the Central Railway Club, held at Buffalo March 23, three subjects were up for discussion: Steel Tracks; Repairs and Material, and the Rules of Interchange.

A committee consisting of John Kirby and A. B. Mitchell presented a report on steel tracks. This amounted to the mere statement that the Fox pressed steel trucks had not been running long enough to make a record for themselves, but seemed to be favorably received, and the committee recommended giving them a trial.

The discussion drifted to the comparative values of cast and malleable iron oil boxes, and here, too, but little information was brought out. There was a difference of opinion as to whether the malleable iron box would wear faster or more slowly than cast iron. The difficulty with the malleable iron boxes would be in getting them to retain their shape while being annealed, while the expense would be about 1½ cents a pound more; but on the whole it may be said that the sense of the meeting was in favor of the use of malleable iron.

Messrs. F. D. Adams and A. C. Robson, as a Committee on Repairs and Material, reported that they could not see how a uniform price could be charged for work done except at a fixed price per hour, because "cars are so very different in construction that it costs more to do the work on any or a certain part of a car of one kind of construction than on another; and, further, it is more work

in some cases to prepare to do the work than in others."

The committee also reported in favor of changing Section D of the interchange rules to read as follows:

"Truck and body bolsters, cross timbers of wood or iron in trucks, spring planks, hangers, or parts sustaining the body in swing motion trucks, truck or body springs broken by excessive load or defective material, provided the car was not derailed or wrecked."

This report elicited a vigorous discussion. Mr. Waitt advocated the establishment of a fixed rate for doing the work; Mr. Mackenzie wanted to strike out only so much of the section as referred to labor, while Mr. Dolbeer was satisfied with the section as it stood. It was asserted that it cost more to collect charges than they were worth, and this was especially true against private car lines. At the same time other speakers said that by keeping a record of all new material used no more clerical labor was required. Mr. Mackenzie finally offered an amendment proposing to strike out the labor question from section C, of rule 8, which was carried.

The special committee, on the request of the Buffalo Superintendents' and Freight Agents' Association for the modification of the rules of interchange in regard to the practice of making repairs of cars under load, and the use of pass cards, presented a report by Mr. Mackenzie.

The report dealt with a number of instances, and closed with this paragraph:

The difficulty in getting badly crippled cars to local points is caused almost wholly by the fact that cars are permitted to go beyond their destination. . . . Your committee recommends that the Buffalo Association of Superintendents or the Master Car Builders representing the different roads centering at Buffalo have what is known as a transfer slip or card to be made out by the inspector of the road delivering the car—this transfer card to go with the car when delivered, and to be handed from one yardmaster to another; and when the car is unloaded to be returned again by the yardmaster with the car. This can either be done by having the card tacked on the side of the car or have a transfer way-bill made out by the inspector and handed by him to the yardmaster. . . .

This report was adopted and the committee instructed to present the same at the next meeting of the superintendents.

The Mt. San Salvatore Cable Road.

Mt. San Salvatore, one of the several prominent Alpine peaks, is now also readily accessible to the tourist by railroad. It was originally intended to model the road after some one of the existing rack railroads, but it was finally decided to operate the line on the cable system.

The road is made up of two sections, with the power station about midway between the lower and upper terminals. It begins at Paradiso, near Lugano, 281 metres (about 925 ft.) above sea level; the middle station, at the end of the first section, is 497 metres (1,630 ft.) above sea level; the end station, San Salvatore, is 883 metres (2,896 ft.), and the summit of the mountain is 909 metres (2,982 ft.) above sea level. In the lower section of the road there is a maximum grade of 38 per cent., and in the upper section, one of 60 per cent. The gauge is one metre, and there is only a single track, the arrangement being such that only one car runs on each section, and these two cars meet at the upper and lower ends of their respective sections for the exchange of passengers. It will be understood from this that the two cable sections run in opposite directions, and that there are no switches and side tracks, the whole design being comparatively simple, though, of course, at the expense of some convenience for the passengers, and of carrying capacity.

Electric power is used to drive the cable, the generating dynamo, in turn, being operated by a 125-H. P. Girard turbine. A second dynamo, driven by a 250-H. P. Girard turbine, is used for electric lighting of the stations and of the town Lugano. The alternating current is employed. The water is taken from a spring at Arogna to a small reservoir near Maroggia, being led through a 5-kilometre conduit. From this reservoir the water is taken to the turbines, the available head being 254 metres (about 833 ft.), giving about 700 H. P. Only a portion of this power is now being used.

From the main power station at Maroggia the electric current from the generating dynamo is carried to the cable driving station, 7,180 metres (about 4½ miles) distant, by means of a copper wire 5 mm. (0.2 in.) in diameter. A current of 22 ampères and 1,800 volts is employed, the loss of potential between the generator and receiver amounting to about 150 volts. The efficiency of transmission is about 71½ per cent. This would have been increased by using a heavier wire, but owing to the abundance of water it was preferred to use the cheaper installation. A 50-H. P. portable engine and boiler is, moreover, provided as a reserve, to be used in case of repairs or in case there should be a failure of water supply.

The cars have two axles each, and comprise four compartments with eight seats in each. There is a platform at each end for an attendant to keep a look-out for possible earth slides and rocks which may have rolled on the track. Each car is provided also with hand as well as automatic brakes, the latter, through the intervention of a speed regulator, coming into action as soon as a fixed rate of speed is exceeded. The cable has a factor of safety of 9½.

For signaling purposes there is a telephone connection between the stations along the line and the turbine station, and an electric apparatus to give starting signals. In addition an electric wire passes along the whole road, slightly above the line of the car roofs. Connection with this can be made by means of movable brass rods extending from the cars, closing an electric circuit when desired, and thus enabling the transmission from the cars to the power station of signals to stop, start, or reverse. Speaking trumpets are further provided for use when necessary.

The total cost of the road was 600,000 francs (about $120,000). The designs were furnished by Messrs. Bucher & Durrer, who also superintended the construction.

Electric Signaling on the Chesapeake & Ohio.

The apparatus of the Electric Secret Service Co., of New York City, which was described in the *Railroad Gazette* of Aug. 28, 1891, is, as our readers know, adapted to a great variety of purposes in connection with railroad operation, and the company now announces a somewhat novel application of it on the above named road, Mr. M. B. Leonard, superintendent of telegraph of that company, having secured patents on certain new combinations which he has put in practice. The main idea is to control not only the operator, but *the signal* at any and all stations in a dispatcher's territory by electrical means, absolutely, from the dispatcher's office, and to do it all on a single wire. Four stations near Richmond are to be equipped at once, and an order has already been given for the equipment of 32 other stations.

The "individual selector" instrument, one to be placed at each telegraph office, is essentially a notched wheel which turns a single revolution in obedience to a combination of dots, or dots and dashes, which is sent over the wire from the dispatcher's office, and which operates the wheel by means of a relay and local battery, the notches being so cut that any other than the right combination will stop the wheel before it completes a whole revolution and thus prevent action, the complete revolution being necessary to close a second local circuit and thus control the signal lever.

The second essential feature of the apparatus is the "answer back," by which an outdoor signal arm which has been actually thrown to the danger position sends back a Morse signal over the wire to the dispatcher. By this means, it will be seen, a signal can be made not only to record its movements at an adjoining station, and thus control the signal there, as in the Sykes system, but can also be made to produce the same results at the dispatcher's office or any number of offices; and as the dispatcher can actuate any number of electromagnets, at one or a number of stations, and either simultaneously or at different times, and do it all upon one wire, the possibilities of the system are very great. We hope to publish a description of the apparatus at an early date.

A Canadian Pacific Cable.

The Canadian Pacific Railway Company has given notice of application to Parliament at its present session for power "to issue ordinary shares of capital stock, instead of perpetual debenture stock, for any purpose for which it can now issue perpetual debenture stock, and for such purposes for which new capital may be required, in such amounts and at such times as its shareholders may hereafter determine." Mr. Hosmer, Superintendent of the Canadian Pacific telegraph service, states that the company has under consideration the question of cable communication between Canada and Japan. A new charter will be procured, unless some arrangement is made with the company which was chartered by the Dominion Parliament in 1888, and of which Sandford Fleming, C. M. G., is the principal promoter. Mr. Fleming has devoted a great deal of time and energy to the formation of the company, and is endeavoring to obtain from the Imperial, Dominion and Australian governments promises of subsidies. The Fleming company is awaiting the result of some deep sea surveys and soundings now being made by the Imperial Government, with a view to ascertaining the depth of the Pacific Ocean along the proposed route of the cable, which is to take a southerly course by way of the Sandwich and Fiji islands.

As to the relative merit of the northern and southern routes across the Pacific, F. N. Gisborne, Superintendent of the Canadian Government telegraphs and cables, estimates the distances and cost of the northern route as follows: Sooke Bay, near Victoria, to Unimak, Aleutian Islands, 1,500; Animak to Attu, the most easterly of Aleutian Islands, 800; Attu Island to Japan, 1,300; total, Victoria to Japan, 3,000. Japan to Manilla, where there is a cable to Hong Kong, China, 529 miles, 1,200; Manilla to New Guinea, 1,140; New Guinea to Port Darwin, Australia, 600; total to Australia, 6,600. To this distance should be added about 12 per cent. to cover the slack of the wire, and estimating the cost at $1,000 per mile would give the following as the approximate cost: Victoria to Japan, 4 320 miles, at $1,000 $4,320,000; Japan to Fort Darwin, 3,360 miles at $1,000, $3,360,000; total, $7,780,600. This, Mr. Gisborne says, would be for a single cable, but experience having shown that it is not safe to depend on a single line for such a long distance, it will probably be found necessary to lay at least two cables to insure continuity of service, which would rather more than double the cost.

The central and southern routes may be called respectively the American and Fleming schemes. The former is for a cable from San Francisco to the Sandwich Islands and thence to Japan by one route, and Australia by the other. By the central route the distance and cost are estimated by Mr. Gisborne as follows: San Francisco to Sandwich Islands, 2,050 nautical miles; Sandwich Islands to Johnson Island, 720; Johnson to Wake Island, 1,380; Wake to Marcus Island, 3,780; Marcus Island to Japan, 1,020; total to Japan, 5,930. Adding 12 per cent. for slack, and estimating the cost at $1,000 as in the northern route, the cost of this route for a single cable would be $6,664,000, and the cable could only reach Japan where it would either connect with the existing lines to Australia or an independent cable would have to be laid, which, taken at the estimate for the northern route, would make an additional cost of $3,360,000.

The southern, or Fleming, route would be but little longer than the northern route, so far as Australia is concerned, but much longer to Japan. To the latter place the distances would be: Sooke Bay, near Victoria, to Sandwich Islands, 2,400 nautical miles; Sandwich Islands to Japan via Johnston, Wake and Marcus Islands, 3,900; total to Japan, 6,300. The distance to Australia by the southern route would be: Smooke Bay to Sandwich Islands, 2,400; Sandwich Islands to Fanning Islands, 1,050; Fanning Islands to Fiji Islands, 1,680; Fiji Islands to Brisbane, Australia, 1,620; total to Australia, 6,750. Adding 12 per cent. for slack and estimating the cost at the same rate for the southern and central routes, the cost would be, for a single cable to Japan, $7,056,000, and to Australia, $7,560,000. If the line from Victoria to the Sandwich Islands is taken as serving for both the Japan and Australian cables, then the cost of the combined cables would be $11,928,000. Leaving the Australian connection out of the question altogether, and dealing only with Japan, the relative cost of the three lines would be: Northern route, $4,320,000; central route, $6,664,000; southern route, $7,056,000. As to the question whether the cable would pay, Mr. Gisborne has no doubt that the northern route would pay, and pay well. He points out that the speed of transmission through a 3,000-mile cable is limited to about 17 words a minute, or, if in condition for duplex working, 25 words per minute, whereas, a cable half that length, say 1,500 miles (the longest which would be used in the northern route), can be duplexed, or quadruplexed, and worked as rapidly as skillful operators can manipulate the instruments.

TECHNICAL.

Manufacturing and Business.

The suit of the Stilwell & Bierce Manufacturing Co., of Dayton, O., against F. N. Brown & Co., for infringement of patents in using the Hoppes live steam feed water purifier, has been decided by the United States District Court for southern Ohio in favor of the plaintiff, the Stilwell patents being broadly sustained and a decree for an injunction and accounting granted.

The Receiver's sale of the De-Oxidized Metal Co., of Bridgeport, Conn., will take place April 19. The sale includes the buildings and tools of the company and its patents.

The Hinckley Brake Co., of Trenton, N. J., was chartered last week. The capital stock of the company is $100,000. The stockholders are: Francis B. Stevens, Jr., Wilmington, Del.; William Du Pont, Elk Point; Lewis J. Allen and Francis C. Lowthorp, Trenton.

A large order for the new standard cattle guard was shipped to the East Tennessee, Virginia & Georgia last week. The manufacturers have had orders from a dozen roads very recently.

Manning, Maxwell & Moore have secured the order, after sharp competition, for one 80-ton and one 20-ton Shaw electric traveling crane, to be erected in the shops of the Midvale Steel Co., of Philadelphia.

The main offices of the Pittsburgh Testing Laboratory have been removed from 95 Fifth avenue to No. 116 Water street, Pittsburgh, where the various branches of the business of Hunt & Clapp, inspecting and metallurgical engineers, will be concentrated in one building.

The Peckham Street Car Wheel & Axle Co., of Kingston, N. Y., reports recent orders for 150 of its motor trucks.

The John A. White Co., Dover, N. H., shipped during the past week to Australia several gear moulders, a self-feeding saw bench to the West Indies, and a complete outfit of machinery for a wood working plant in Alaska. The company has just issued a new pocket manual of its wood working machinery, which will be mailed upon application.

St. Paul & White R. R. Bear Power Station and Equipment.

The power station will be located at North St. Paul, and will include Thomson-Houston dynamos for operating the line. There will be two Ideal engines of 100 H. P. each, and two Babcock & Wilcox boilers each of the same capacity. The equipment will consist of five cars vestibuled on one end, and always run in one direction. These cars will be each mounted on two four-wheel trucks, and run by Thomson-Houston motors. The Northwestern Thomson-Houston Electric Co., of St. Paul, has the contract for building the line, installing the power station and furnishing the equipment.

Structural Iron Plant at Duluth.

The bonus $125,000 for the James E. York open hearth structural steel plant has been raised and work will be begun at once upon its construction. The plant will be located at Ironton, between Duluth and West Duluth. About 30,000 tons of ore have been contributed to this company by the iron mining companies in Northern Minnesota. This plant will employ 500 men and the estimated daily output is 100 tons.

Stewart Avenue Interlocking.

The contract for the power-house and the signal tower for the extensive pneumatic interlocking at Stewart avenue, Chicago, has been awarded to Grace & Hyde, of Chicago, a firm which has built many stations and other railroad buildings. This interlocking will require a signal bridge over 100 ft. long and another of 80 ft. These will be erected by The Union Switch and Signal Co. As heretofore stated, the signal lamps are to be equipped with incandescent electric lights. The erection of this signaling plant will probably take all summer.

Fox Emergency Train Stop.

An exhibition test of this automatic train stop was made on the New York & Northern Railroad on March 31, near High Bridge, New York City. An engine, equipped with the "stop" and drawing three passenger cars, was used. This device is applied to the locomotive, and when it comes in contact with a ground device placed near the track applies the brakes by opening a valve in the air brake pipe. The appliance is intended to be placed near drawbridges, grade crossings, etc.

A valve connected with a branch pipe leading from the main air brake pipe of the engine is fixed directly back of the pilot, on either side of the locomotive and in front of the forward wheels, in such a position outside of and from 8 to 12 in. above the rail as to clear all ordinary obstructions. The ground device is fastened to a tie in a position so as to properly engage the arm of the air-valve. It has a T-head held in position by coiled springs of sufficient stiffness to properly open the valve as the engine strikes it, the springs providing sufficient elasticity to obviate any shock due to the speed of the moving train, or to deflect in an encounter with a snow plow. The ground device is thrown out of position when the signals show "all clear."

In addition to the above, the inventor has devised a portable emergency stop, having the same T-head or upright, constructed in the same manner, with the exception that the base is a light metal frame, so arranged as to be slipped under and against the outer flange of the rail and rested on the ties. This portable emergency stop is intended for use by train flagmen.

A number of railroad men were present, who were much interested in the operation of the apparatus.

New Stations and Shops.

The contract for the construction of the Philadelphia & Reading Railroad's terminal station, at Twelfth and Market streets, Philadelphia, has been awarded to Charles McCall, who is also building the great trainshed. The work of erecting the roof is now being done very rapidly by the Phœnix Bridge Co. The work on the terminal is in such a forward state that there is little doubt it can be opened next September, though the eight story station building may not be completed at that time.

At the last meeting of the directors of the Pittsburgh, Wheeling & Kentucky $50,000 was appropriated for a new passenger station at Wheeling, W. Va. Thecompany last year decided to build such a station and had the plans prepared, but the project was defeated by the city of Wheeling refusing to vacate a part of the public Ohio river Wharf so that the necessary tracks could be put in. It is understood that a new proposition will be presented to the city council and that the company has assurances that it will be accepted.

The West Virginia and Pittsburgh is building a new two-story passenger and freight station with room for general offices at Weston W. Va.

The property required for the proposed union passenger station at Fairmont, W. Va., has been purchased, and all the plans have been prepared. The station is to be erected by the Baltimore & Ohio, the Fairmont, Morgantown & Pittsburgh branch, and the Monongahela River road. The building is to be of stone and brick, three stories high, and will be about 100 ft. long. The present Baltimore & Ohio station will be replaced with a freight house. A 60 ft. retaining wall will be erected, and the long trestle at Coal Run will also be replaced by several double track brick arches.

Hollow Stay Bolts.

The Philadelphia & Reading, Atlantic & Pacific, Chicago & Alton, Illinois Central, Vandalia Line, and the Toledo, St. Louis & Kansas City are among the railroads that have recently adopted the mandrel rolled hollow stay bolts. The Falls Hollow Stay Bolt Co. report that the demand for their product has largely increased.

Grant Locomotive Works, Chicago.

These shops will be ready for operation by July 1, and possibly before that. Many of the tools have been received, and they are rapidly being put in position. The tools from the old Grant Locomotive Works have been taken apart and thoroughly cleaned and repaired. These, with the new tools, make a large equipment, in the machine shop more particularly, and there will be a larger number of tools in proportion to the expected output than is found in almost any other shop in the country. The tools at the old Grant works were not much worn. A careful examination after cleaning shows them to be in good serviceable condition, and as they were built by some of the best builders they are practically equal in earning capacity to most of the newer tools. There is an ample supply of new machines, and all of the special tools essential to rapid construction have been purchased, the best builders in this country being drawn upon. When the works are completed the apparatus in the different departments, including the electric cranes, hydraulic riveters, annealing furnaces, bolt machinery, and rod and link tools, will be equal in kind to that of any other shop in the United States.

The American Locomotives in Australia.

The Baldwin compounds on the New South Wales Government railroads are doing very good work. In the issue of March 25 the *Engineer* gives an account of their performance on a grade of 176 ft. per mile.

Improved Salisbury Iron.

The Landon Iron Company, owning and operating one of the oldest furnaces in Salisbury, located at Chapinville, Salisbury Township, Conn., have for some months past been making experiments to improve the quality of the celebrated Salisbury car wheel iron, and have erected kilns in which their ore is calcined before its reduction in the furnace. As a result, they are making iron of unusual strength, the tests of Nos. 3 and 4 irons average from 34,761 to 41,882 lbs. per square inch tensile strength. These samples are run direct from the pig bed. The iron is very sharp grained, of remarkably good color, and gives a hard and dense chill when melted into car wheels, while the plates are soft and more elastic than those of the wheels manufactured from pig iron made with uncalcined ores.

THE SCRAP HEAP.

World's Fair Notes.

Up to date more than 7,600 carloads of building material have been received on the grounds.

The Cunard Steamship Co. will exhibit a series of models illustrating the development of Trans-Atlantic travel.

The proposition of the Standard Oil Co. to furnish fuel for the Exposition power plant at 72½ cents a barrel has been accepted.

The Canadian Pacific will exhibit a model passenger train and models of the fine ocean steamers in that company's service.

One of the large trusses for the manufacturers' building is now in position. These trusses have a span of 380 ft. and a height of 211 ft.

Harper Bros., Scribner & Sons, and the Century Company, will exhibit cuts showing the history of transportation in this and foreign countries.

The Department of Mines and Minings has issued a short review of the history of the evolution of mining and metallurgy as it will be shown at the World's Fair.

The limited time in which states, territories and foreign countries must accept the sites allotted to them on the Exposition grounds has been fixed at June 1, 1892.

A large amount of the ornamental staff work is already in position on the various buildings. As soon as the weather is a little warmer the work will proceed with great rapidity.

The electric light controversy has been settled and the Exposition Company will now pay $20 per lamp for the 6,000 lamps required. The contracts for the 100,000 incandescent lamps have not been made.

Among the transportation exhibits in the marine section will be models of the old frigate "Constitution," and other historical ships, and also models of the fast American sloop yachts, and of twin screw ferryboats, etc.

The power for the grounds and buildings will be furnished from boilers of 10,000 h. p. capacity, constructed at an expense of about $79,300. The fuel will be oil. A contract for 225,000 barrels has been let for 72½ cents a barrel.

Australia will send a clock 25 ft. square and 40 ft. high. It will probably be the most wonderful astronomical clock ever made. The case is made of colonial cedar, and various dials will show the position of the planets and their satellites.

At the dedication ceremonies next October there will be a procession of centuries or parade of symbolical floats through the lagoons and water-ways of the grounds. The contract for the construction of 24 floats has been let at about $3,800 each.

The election of the President of the Board of Directors is soon to be made, and Mr. Henry B. Stone, so well known as the General Manager and Vice-President of the Chicago, Burlington & Quincy, and now President of the Chicago Union Telephone Co., has been proposed for the office.

The last day for receiving propositions and bids for the construction of an Intramural railroad was April 2, and the directors are now considering the feasibility of the various plans. In any case, the structure will be an elevated one, and the suggestion of trains of electric street cars, with motors on each car all controlled from the end of the train, is received with the most favor.

The Congressional World's Fair Investigating Committee has begun its work. The report of President Palmer and Baker to this committee shows what has been done with the funds received up to date, and how much more will be required up to the close of the fair. The estimate is $22,226,000, and $6,252,000 has been received from all sources to date. The balance due on stock subscriptions and from Chicago is $5,713,000. Mr. Baker says the rate of entrance to the fair will probably be 50 cents, and the receipts from this source will be about $12,500,000. The estimated salvage on material is $1,000,000.

Two New White Star Steamers.

The White Star Line proposes to build soon two steamers intended to surpass the new Cunarders now in course of construction on the Clyde.

Public Improvements in Chicago.

The annual report of the Commissioner of Public Works of the city of Chicago contains some interesting information. During last year 103 miles of sewers were laid, making a total of 888 miles in the city. One hundred and sixty-eight thousand eight hundred and eighty-two square yards of paving were laid by the street railroad companies. Of the total of 2,334 miles of streets, 774 miles are paved. The total expenditure for public improvements was $5,565,879. The water was supplied by 22 pumping engines, with a delivering capacity of 200,000,000 gallons daily. The daily average of water used throughout the year was 174,000,000 gallons. Good progress has been made on the four-mile tunnel into the lake. The distance between the lake heading and the shore heading has been diminished by 8,125 ft. during the year. On the Lake View tunnel a length of 5,313 ft. has been completed, leaving 4,737 ft. to bore before it will be finished.

The reasons for the unusually low water of last year are given in the Commissioner's report as follows:

"Investigations in the engineering bureau regarding the stage of water in Lake Michigan, from data covering the catchment area or basin of the upper lakes, explain most conclusively the cause of this most remarkable low stage of water. It appears there has been a steady decrease in precipitation with an increase of mean temperature over the basin of the upper lakes since 1884; the slight improvement shown in 1888 and 1890 was not sufficient to stay the downward tendency of mean water in the lake. We cannot hope for even as good a condition of water in Lake Michigan in 1892 as that we suffered under during 1891. Unless we have some heavy rains before the frost leaves the ground the navigable condition of the harbor will be much worse this year, for the increase in precipitation in any one year is not felt in the lake condition until the year following, provided the temperature remains the same."

There are in the city of Chicago 375 miles of street car lines. The expense for lighting the city for the year was $705,664. The area of the city is something over 180 square miles. The population is about 1,350,000, and the total bonded indebtedness is $13,545,400. The city owns real estate to the value of $37,690,876.

Gas Explosion in a Passenger Car.

A passenger car in train No 3 of the Erie road was set afire and entirely burned up near New Portage, O., on the evening of March 30, the cause of the explosion being an escape of illuminating gas in the closet of the car, the gas being ignited by the oil lamp which was burning in that apartment. The cause of the opening or rupture of the pipe has not been clearly explained. The conductor, on entering the car, noticed the odor of gas and heard a noise as of air or gas escaping under pressure; he opened the closet door, when the explosion immediately took place and filled the end of the car with flame. The conductor was considerably burned, but the train was stopped and the passengers all escaped. There was a slightly intoxicated passenger on the train, but there is yet no evidence that he had tampered with the gas pipes, although a report to that effect was published.

Instruction in the Primary Class.

Commissioner E. E. Hill of the Denver Demurrage Bureau, said in regard to Judge Rising's decision in the demurrage case: "A shipper believes it is wrong for a railroad company to charge shippers who use its cars for storage purposes. Suppose I were to order a wagon load of goods from this shipper, and when his driver delivered them at my house I were to tell him to leave his wagon in the alley, and I would unload them at my convenience. If I kept that wagon for a month in the alley before unloading it, I am inclined to think he would want pay for it; or if there were more customers like myself he would have to purchase a new wagon every day, and that would soon drive him out of business."—*Denver Paper.*

Stevens Institute of Technology.

The executive committee of the Alumni Association of this Institute have started a subscription to raise $50,000, which is greatly needed for the construction of a new building, the present facilities being crowded to their utmost limits. Over $10,000 has already been subscribed, and $1,700 more conditionally. A circular has been issued setting forth the needs of the Institute and the plans of the Alumni, and giving the names of prominent men who have been appointed to receive subscriptions. Each contribution of $5,000 or over from an individual entitles him and his heirs to a perpetual scholarship. Mr. William L. Lyall, 540 West Twenty-third street, New York City, is Secretary of the Alumni Executive Committee.

The following additions have recently been made to the Board of Trustees of the Stevens Institute: Andrew Carnegie, Charles Macdonald, President of the Union Bridge Co; Chancellor McGill, of New Jersey; Col. E. A. Stevens and A. C. Humphreys.

Mr. Hopkins' Gift to Stanford University.

Timothy Hopkins, who resigned last week as Treasurer of the Southern Pacific Company, has presented to Stanford University his collection of books on railroading, numbering 1,000 volumes, and an equal number of pamphlets. Valuable features of the collection are the reports of the Railroad Commissioners of all the states in this country and all the English Parliamentary reports. Among the pamphlets are complete histories of the Camden & Amboy Road, the first line in this country, and of the Boston & Albany Road. Mr. Hopkins had a very complete file of the *Railroad Gazette*. Mr. Hopkins has requested the University Librarian to add to the collection every work on railroads in any language. Mr. Hopkins had already designated several thousand volumes which he had intended to purchase, but was prevented by pressure of other business. These will now be procured. Two years will probably suffice in which to make the purchases, and when all have been delivered the "Hopkins Railway Annex" will be the most complete library on the subject in existence. In connection with the Hopkins collection of books, there will be one of models of railroad inventions, to which will be added recent improvements as they are suggested. The Hopkins gift is now valued at $12,000, but when completed its value will be much greater.

Hamilton Incline.

Work on the Incline Railroad at Hamilton, Ont., is progressing rapidly, and unless something unforeseen occurs to prevent, there seems every probability of the road being in operation by May 24. The machinery, which is at Galt, will be shipped next week, and as soon as it is placed in position the ties and rails will be laid. The cars have also been completed.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in his journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in considerationof advertising patronage.*

We show in this issue the ingenious and bold design prepared by Mr. Waddell for bridging the ship canal which separates Minnesota Point from the city of Duluth. This is one of several designs which have been made for this bridge within the last two years; but up to now the shipping interests have prevented any one of them from being built. This opposition continues; and at the hearing before the Board of Engineer officers, in Detroit, last month, the arguments for and against bridging the canal were very earnest. The fate of the scheme is therefore still uncertain. It is a matter of principle with many persons to fight every possible obstruction of navigable waters, and this jealous vigilance has, of course, been immensely useful many times, but it can be carried too far. For instance, Mr. Depew lately told of the case where 25,000 people, mostly New York business men, were backed up for 20 miles on the three roads entering by the Fourth avenue lines by a scow that got fast in the drawbridge over the Harlem; and the cargo of that scow consisted of a calf and a barrel of apples. Yet the principle had to be maintained, and the drawbridge duly swung for the scow, even if the commuter lost $1,000 worth of time. In the Duluth case the ship canal is really important. The tonnage through it is very heavy, as it forms practically the main entrance to the harbor from Lake Superior. The alternate route is around Minnesota Point some half dozen miles. On the other hand, Minnesota Point, if connected to the city by railroad, streets and street railroad would at once open up for use an immensely valuable property and practically make available about two or three miles of additional water front. With the growing commerce of Duluth, and the imminent need of more room near the water level of the harbor, any means of connecting Minnesota Point with the city without seriously interfering with the shipping should be carefully considered. The solution offered by Mr. Waddell is certainly worth serious attention. A swing bridge is objectionable because of the limited room to swing it, but the proposed lift bridge occupies no space that is needed for shipping or wharves and can, it is estimated, be lifted clear of the tallest spars in two or two and a half minutes. The design is certainly novel and bold, but the machinery for operating the bridge is of well known type, and all of the mechanical devices are in constant use and are approved of by the most competent elevator builders. The greatest element of uncertainty would be, we should say, the preservation of the uprightness of the towers in all directions with sufficient exactness. It may be found advisable to put in struts between the towers across the canal and it is proposed to use sliding plates under the feet of the rear columns to adjust for inclination. All of these, however, are matters which are quite within the skill and resource of a modern bridge engineer of high class.

Coupler Standards and Tests.

The Committee on Standards appointed by the Master Car Builders' Association at the convention of 1891 met last week at Buffalo and discussed at considerable length what is best to be done to improve the quality of M. C. B. couplers now being made and to reduce the breakages in service. It was decided to propose a test to be used in the purchase of all couplers. The drop test proposed consists of three blows at 10 ft. and two blows at 15 ft. The pulling test was fixed at 100,000 lbs., but there was a strong sentiment that 110,000 lbs. would be better, as it would more nearly correspond with the stresses which occur in actual service during a reaction after the application of the emergency brake. The question of tail bolts *vs.* straps was considerably discussed, and the opinion was unanimous against the tail bolt and in favor of the strap. In making tests of couplers, it is proposed to take the drawbar and the knuckle separately. A bad knuckle will not condemn the bar and a bad bar will not condemn the knuckle. A failure under the drop test means that the coupler must break into two or more pieces. It is not proposed to consider a cracked coupler as having failed. The committee adjourned to meet in Pittsburg on April 26, and invitations will be sent to coupler manufacturers and others interested to meet at that time to discuss the proposed tests and to consider the limits that have been adopted for the coupler gauges.

These steps will doubtless lead to a decided change in the condition of the vertical plane coupler question the coming year. There will probably be standard tests and standard gauges of a practical sort, which will make it easy for any railroad company to purchase couplers under test and with a definite knowledge of what it is buying, and there will be hope of forcing out of the market a number of makers of couplers who are putting in a class of material that is wholly unfit for the purpose. Much has been said about the need of reducing the number of patterns, but those who favor such reduction can now rest for awhile until the effect of a rigid inspection and test is shown.

One hundred thousand pounds is not enough resistance for a vertical plane coupler in a pulling machine; for taking the links we now use, which have to stand 95,000 lbs., and increasing the size for future use in the way links have been increased in the last five years, the result is a coupling that, if rightly made, would stand from 110,000 to 120,000 lbs. As a vertical plane coupler is more expensive than a link and costs more to replace when broken, and as the cost would not be materially greater to make it withstand 120,000 lbs., it seems clearly evident that the limit should be raised to the highest point where the couplers can be purchased at a reasonable cost.

The strength of a connection between cars is as much dependent upon the attachments of the draw gear as upon the coupler itself, and, as shown in recent air brake tests, the attachments are often weaker than the couplers. Tail bolts are too weak to be safe, as shown by the experience of the Pennsylvania, the Chicago, Burlington & Quincy, the Chicago & Northwestern, the Lehigh Valley and others. The strap is now favored almost universally instead of the tail bolt. When couplers are pulled in a testing machine the tail bolts invariably break before the coupler and a pair of clamps have to be used to grip the shank in order to hold the coupler, so that it may be tested. A strap end does not break in this way. Most of those who have discarded the tail bolt and returned to the strap, believe that the loose pieces placed on the shank of the coupler between the shank and the strap detract from the general strength of the coupler, and that the bearing for the strap end should be cast in one piece with the coupler shank. This is certainly an advantage, if we are to rely upon the results of tests of straps, as such tests invariably show that the loose pieces permit a bending as well as a shearing strain on the rivets, and therefore cause the rivets to break before they would if subjected to a shear alone.

The committee's specifications for tests will require that couplers weigh 210 lbs. or less and in no case more than 220 lbs. It was at first proposed that a minimum limit of weight be also specified, but as light wrought steel or wrought iron couplers might be offered, which would be, generally speaking, stronger than malleable iron, and it would not be just to rule them out.

The proposition to consider a crack as not a failure and that a failure must be considered as breaking into two or more pieces can hardly be regarded as satisfactory, as a cracked coupler soon becomes a broken one. If the tests are going to be so severe as to crack couplers that are strong enough for service, then they should be reduced to a point where there may be no misunderstanding as to what is meant by a failure. A sharp line can only be drawn by requiring that a coupler shall stand without crack, fracture or breakage of any kind, a test that can be made a standard. So, too, a clause should be added regarding the bending of knuckles, as there are knuckles now used that would not stand the proposed tests without bending so much as to prevent coupling. Whatever the tests, they should be such as to leave a good coupler in a condition fit to be put into service. A bent knuckle must be deemed a failure and so must a fracture, either of the knuckle or the head. To consider the bar and the knuckles separately it is but justice to all, as some couplers are strong enough in the heads but weak in the knuckles, and a test would show the location of the weakness and permit the manufacturers to make such changes as would bring their product up to the required quality.

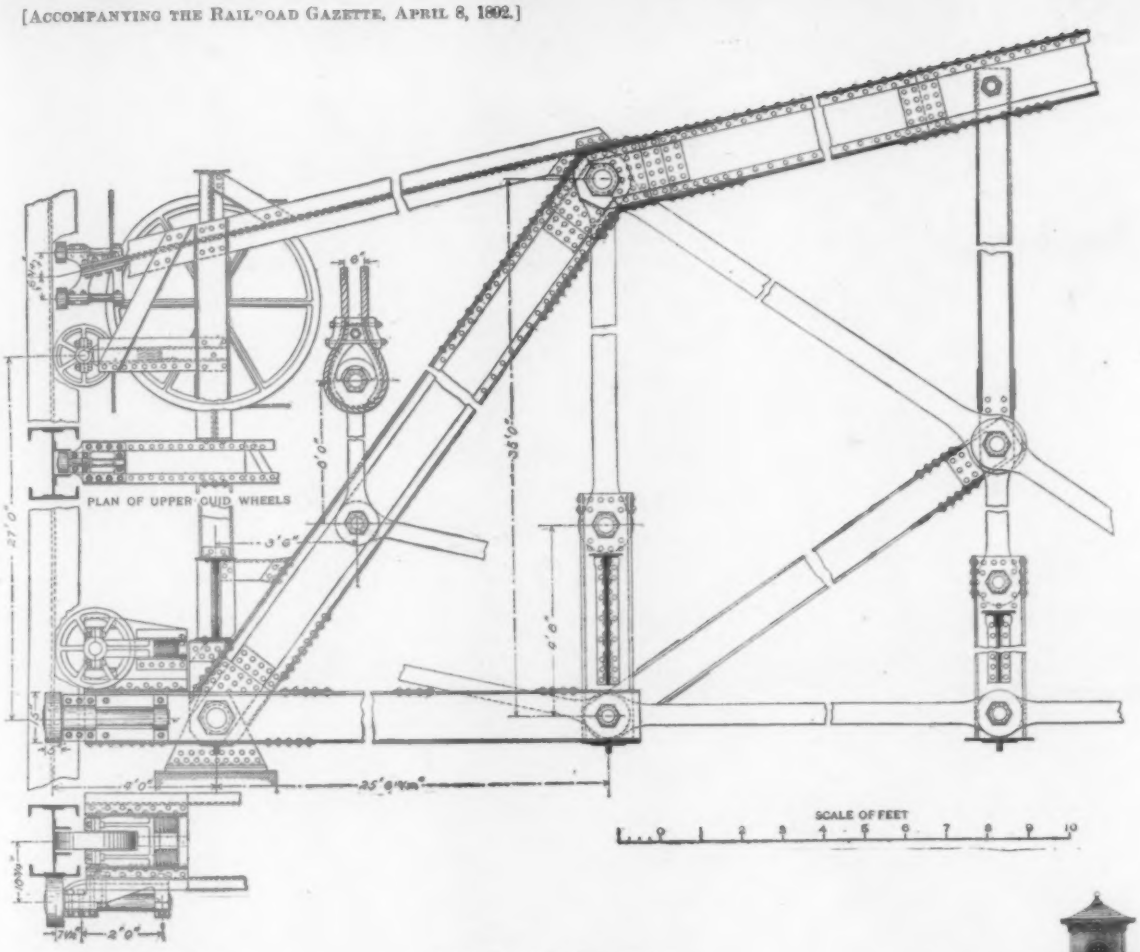
It may be of interest to add here that several couplers recently pulled stood 151,000 lbs. without appreciable bending; and they weighed, all complete, only 187 lbs. Another type stood 150,000 lbs. before fracture. These were of steel, one made at Alliance, O., the other at Chicago. A malleable iron coupler made at Columbus stood 120,000 lbs., and endured a drop test much more severe than that proposed by the committee. When the head was laid down flat and the blows delivered on the pivot lugs, they bent down one inch before fracture. That is malleable iron worthy of the name, and if it can be regularly furnished for general work it ought to serve, in some degree at least, to revive the waning confidence in that material for severe work. As far as can now be learned about the reasons for the differences in the quality of malleable iron, it appears that the ductility and strength largely depend upon the materials used. A coke iron gives results much inferior to those given by a charcoal iron, and we believe that the superior metal just referred to was made entirely of charcoal iron.

So, then, couplers *can* be made of malleable iron that will prove and do prove much more than equal to the proposed tests, and it is needless to observe that those tests are not too severe. But if it is proposed to use the same drop test on the drawhead guard arm as upon the head with the knuckle in it, then the tests are without doubt too high for malleable iron, as not one of the couplers yet tested, except the steel ones, will stand much more than half of the proposed drop test.

The Chicago, Burlington & Quincy Railroad.

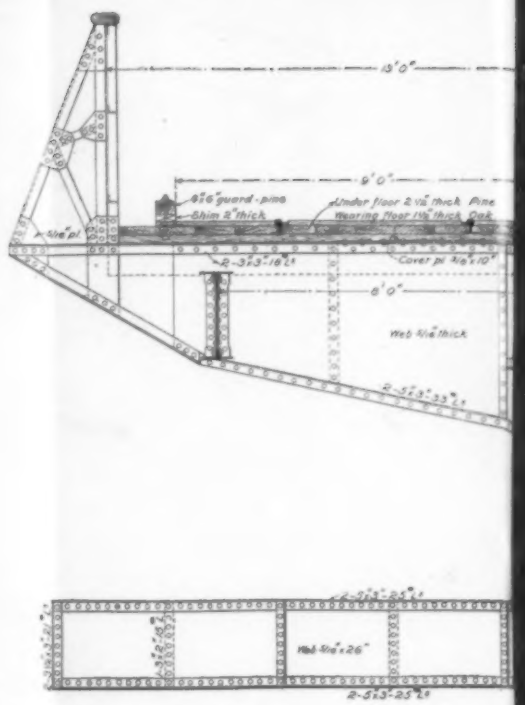
This great property, for many years one of the most profitable railroads in the world, but which has suffered a tremendous reduction of its profits since 1887, had a somewhat unfavorable traffic year in 1891, owing chiefly and perhaps wholly to the bad crops in 1890; and until the great harvests of last year began to come forward it seemed as if 1891 would be, next to the year of the strike, the most disastrous in the history of the company. In the first half of last year the gross earnings were $1,863,272, and the net earnings, in spite of heroic reductions in working expenses, $629,837 less than in 1890. That the reduction in expenses was severe, if not "heroic," may be judged by the fact that the expenditures for repairs in the first half of 1891 were 24 per cent. less than in the corresponding half of 1890, the expenditures for track repairs being 27 per cent. less, all of which was more than made good in the last half of the year. The good crops came very opportunely for the company, but will be felt much more on this year's than on last year's business, the chief of the crops in its territory being corn, which is not marketed much before January, and whose effect continues throughout the year, especially in promoting a large production of hogs, to be marketed a full year or more after the corn is grown, it not being possible to improvise a stock of animals to consume an abundant crop, and a very poor crop of corn in 1890 having compelled a great reduction of the stock of hogs, as has been shown by a great decrease in the number packed during the last winter season. How important the corn crop is to this company is only partly shown by the fact that in the first half of 1890, after a large crop similar to last year's, shipments of this grain from places on its own lines in Kansas and Nebraska yielded this railroad about $2,250,000; and the great gain of $800,000 in net earnings reported for the first two months of this year (equal to $1.05 per share of stock) was doubtless largely due to this business.

For the whole year, 1891, the passenger traffic was about 1 per cent., and the freight traffic no less than 8¼ per cent. less than in 1890; in spite of which there was an increase of 5.6 per cent. in passenger earnings, and in freight earnings a decrease of only 2¼ per cent. —that is, average rates were higher, which, in the case of freight, was probably due to a falling off in the freight moved long distances at the lowest rates greater

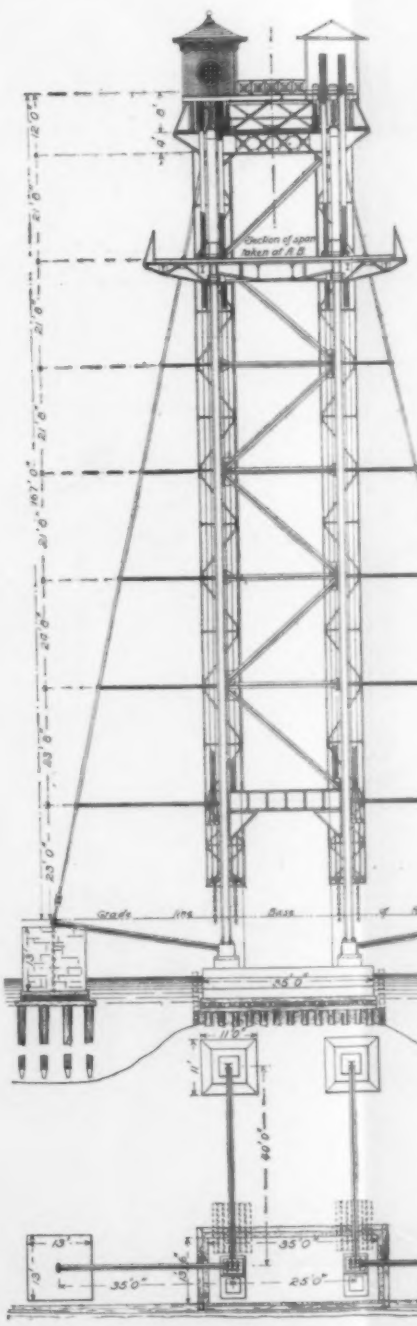


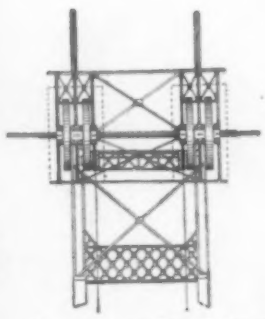
Plan of Lower Guide Wheel.

Guide Wheels and Truss Details.

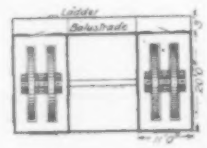


Highway Stringer.



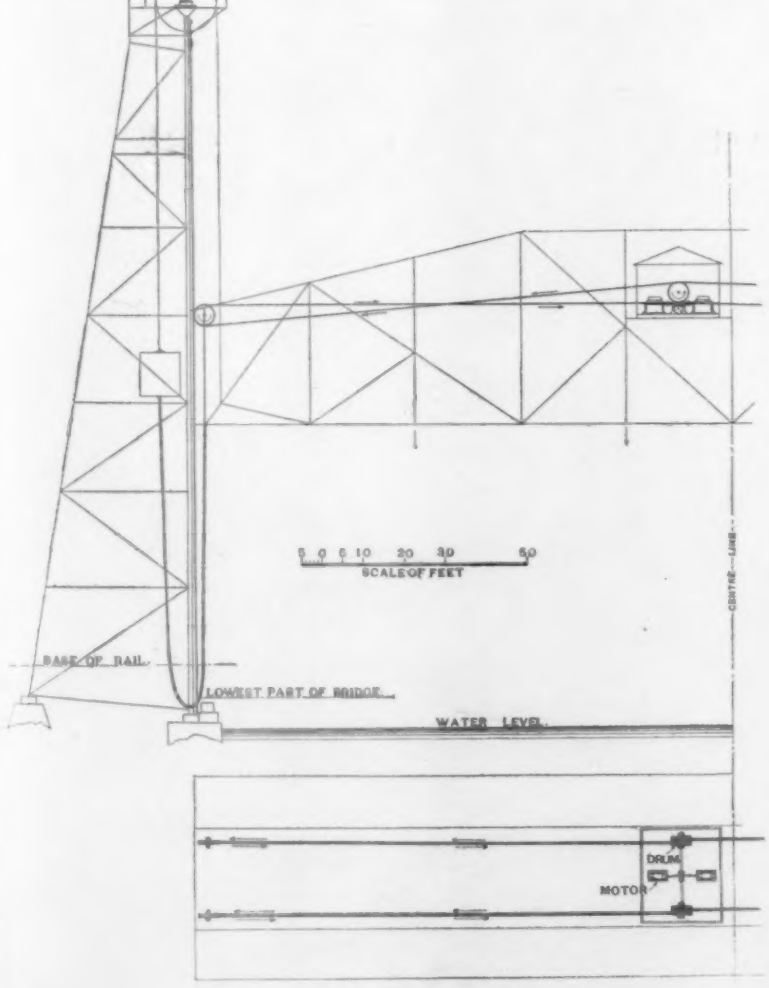


Plan of Upper Part of Tower.



Plan of Houses over Wheels.

Side Elevation a

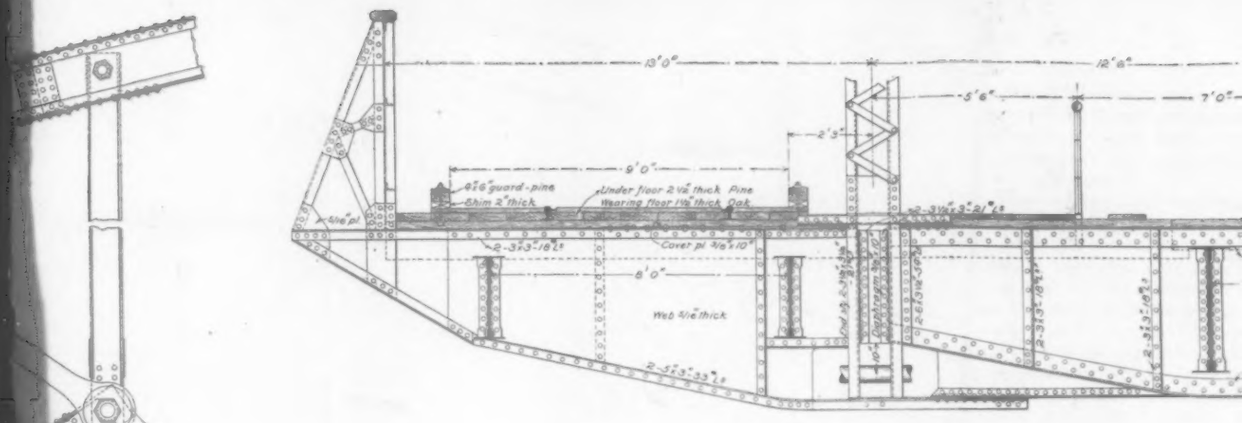


Machinery Plan.

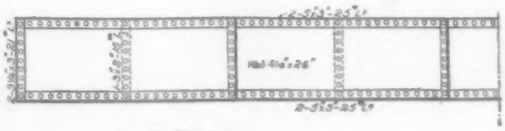
Inner Elevation and Plan of Piers.

PROPOSED LIFT BRIDGE ACROSS THE SHIP CANAL AT DULUT

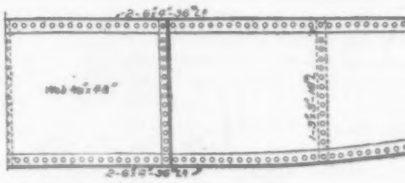
Designed by Mr. J. A. L. WADDELL, *M. A*



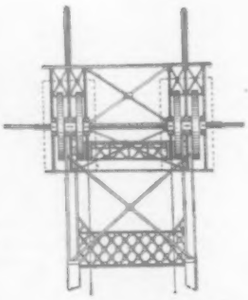
Floor System.



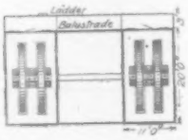
Highway Stringer.



Railroad Stringer.

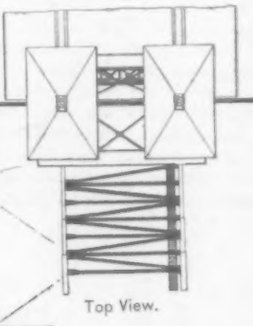


Plan of Upper Part of Tower.



Plan of Houses over Wheels.

Outer Elevation.



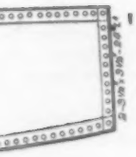
Top View.

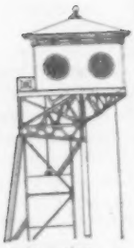
Inner Elevation and Plan of Piers.

Side Elevation and Section of Towers.

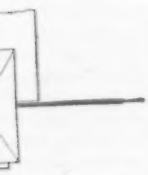
PROPOSED LIFT BRIDGE ACROSS THE SHIP CANAL AT DULUTH, MINN. EXTREME LIFT, 133 FEET.

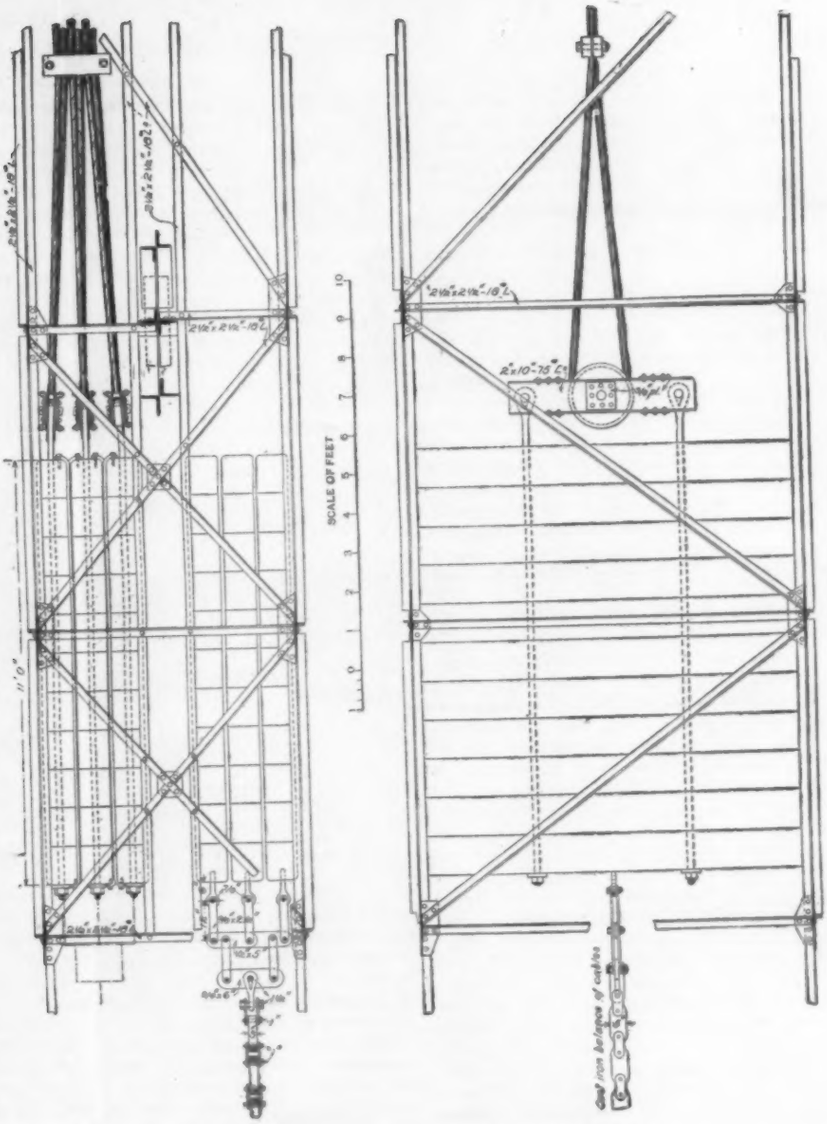
Designed by Mr. J. A. L. WADDELL, *M. Am. Soc. C. E.*





Side Elevation

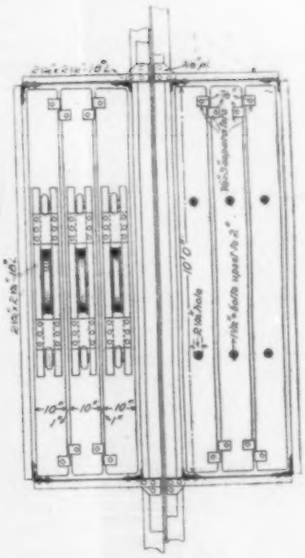




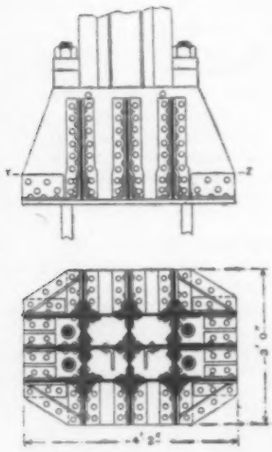
End Elevation.

Side Elevation.

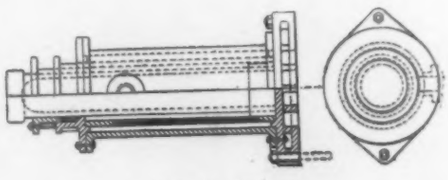
Detail of Counter-Balance.



Plan of Counter-Balance.



Main Post Foot Detail : Section on Y. Z.



Hydraulic Buffer.

than in that of the local freight. In 1890 the average rates were but 2.177 cents per passenger mile and 0.952 cent per ton mile, which, for a system with so thin a traffic, is extremely low. Last year the averages were 2.236 and 1.018 cents.

The gross earnings last year were a trifle greater than in 1890, in spite of the smaller traffic, but the increase of $390,600 in net earnings was chiefly due to a reduction in expenses. The gain in net earnings is just about equal to the increase in fixed charges, and the fact that the total profits over fixed charges were materially greater than in 1890 was chiefly due to a great increase in the income from the controlled lines. These properties, in which the Chicago, Burlington & Quincy has invested $30,750,000, had previously yielded but a small direct revenue, it having been for the years in which it has been reported separately:

1889.	1890.	1891.
$636,307	$610,030	$1,308,100

Before 1889 the income from these investments was included with that from "interest and exchange," and the sum of them when greatest was $859,035, in 1887, and averaged $570.000 a year for the six years after 1881. A summary of the aggregate operating accounts of these controlled roads shows little change in gross earnings from 1890, but a decrease of half a million in working expenses.

To comprehend the position and general tendency of this great property, however, we need to consider its history for more than the last two years. We purpose to go back not exactly to remote antiquity, but to a period which already seems remote to most of us, though not by any means in the dark ages, for to this company it was resplendently bright.

The company closed one period of its existence in 1879, then acquiring the Burlington & Missouri River Railroad in Nebraska, which added about one-half to its mileage. From 1865 to 1876, inclusive, it had paid 10 per cent. dividends every year except one, when it paid 15 per cent. The dividend was reduced to 9 per cent. in 1877 and to 8 in 1878, but was made 10 again in 1879. After acquiring the Nebraska system it paid 8 per cent. until 1888.

But these large dividends do not adequately indicate the profits of the company in those days. After meeting all charges and paying these dividends a large surplus remained every year, substantially the whole of which went to pay for additions to or improvements of the property which otherwise would have required additional issues of stock or bonds. By the end of 1887 this accumulated undivided surplus amounted to about $30,000,000, or about 40 per cent. on the capital stock. In 1879 the profits over fixed charges were equal to about 16 per cent. on the stock, and for the first eight years after the consolidation, ending with 1887, they averaged $11.70 per share. With so profitable a property, capitalized at $30,000,000 less than its cost, the position of this company seemed exceptionally strong. Then it was struck as by a cyclone in 1888, and did not earn its fixed charges, and though it has done much better ever since the results in any year since 1888 compared those of any year before seem as if they could not come from the same property. Below we give the profits per share over all charges in every year since 1879. Net earnings, receipts from investments, and the net receipts from the Nebraska land grant are included in the income, from which all interest and rentals and payments into sinking funds are subtracted to ascertain the profits.

Year.	Profit per share.	Year.	Profit per share.
1880	$13.85	1886	$11.11
1881	12.64	1887	9.97
1882	10.60	1888 (deficit)	0.67
1883	13.41	1889	4.83
1884	10.30	1890	4.60
1885	11.26	1891	5.34

Thus the aggregate profits per share for the last four years ($14.10) are but little greater than for the single year 1880 or 1883, and last year, which was the best of the new era, they were not one-half as great as in the most unfavorable year previous to 1887. What happened in 1888, therefore, seems to have been a radical change in the situation of this great property, which, though likely to increase its profits under favorable circumstances, as they are now improving, seems very far indeed from the position which it held before 1888. The great disaster of that year, when as we see the road did not earn its fixed charges and sinking funds, had, it is true, one special temporary cause, the great engineers' strike, but it had also general causes—the diversion of traffic by new lines competing with this railroad, and the reduction of rates, partly due to the increased competition and partly to state and national railroad legislation. The effect of the strike since 1888 has probably been insignificant; that of the other causes continues. The lines of the Atchison, Topeka & Santa Fe, the Milwaukee & St. Paul and the Chicago, St. Paul & Kansas, between Chicago and Kansas City, and the numerous other new lines which compete with the Burlington, still exist and will continue to carry traffic.

After the consolidation with the Nebraska system, the Chicago, Burlington & Quincy Company worked in 1880 an average of 2,512 miles of road and it owned at the end of that year 2,675 miles. Its mileage increased one-fifth two years later, but the earnings remained nearly stationary until 1888, when they jumped from 21¼ to 26 millions at once, *and the gross earnings have remained nearly stationary ever since*, while the mileage has increased from 3,255 to 5,285, and there has been, of course, a great increase in the the capital invested in the property. Let us make some comparisons of the last year with 1883:

	1891.	1883.	Inc. or dec.	P. c.
Av. miles worked	5,285	3,255	+ 2,030	62.4
Miles owned end of year	5,167	3,224	+ 1,943	60.0
No locomotives	750	542	+ 208	38.4
No. cars	29,961	20,184	+ 9,777	48.4
Investments (controlled roads and other)	$32,961,806	$25,583,069	+ $7,378,737	28.8
Capital stock	$76,394,905	$71,941,247	+ $4,453,658	6.2
Funded debt	$114,431,481	$77,408,491	+ $37,022,991	48.0
Pass. miles	283,343,493	243,946,741	+ 45,396,752	18.6
Ton miles	1,804,977,505	1,552,141,453	+ 252,836,052	16.3
Gross earnings	$27,916,128	$26,110,369	+ $1,805,759	7.0
Working expenses	18,549,258	13,496,478	+ 5,052,780	37.4
Net earnings	$9,366,870	$12,613,891	— $3,247,021	25.7
Income from controlled roads, etc	1,371,627	324,180	+ 1,047,447	323.1
Neb. land grant	156,848	1,595,788	— 1,438,940	90.2
Total net income	$10,895,345	$14,533,859	— $3,638,514	25.0
Fixed charges and sinking funds	6,812,385	4,883,941	+ 1,928,444	39 5
Balance	$4,082 960	$9,649,918	— $5,566,958	57.7
Dividends	3,246,685	5,566,484	— 2,319,798	41.7
Surplus	$836,274	$4,083,434	— 3,247,160	79 5

The mileage has been enormously increased and at low cost; the increase in traffic has not been great, and not nearly so great as the increase in working expenses, which has been 37¼ per cent., against an increase of only 7 per cent. in gross earnings, with the result that net earnings have decreased more than one-fourth, and by an amount equal to more than 4 per cent. on the present share capital. The income from investments in other roads has increased more than a million; that from the Nebraska land grant has decreased by a greater amount. The excess of income over charges—the profits—are $5,567,000 less from the present system of 5,285 miles than from the 3,255 miles in 1883—not half as great. The decline in the receipts from the land grant was to be expected. In the eight years from 1880 to 1887 this land grant produced $8,524,506 net, and reduced by so much the debt on which the company pays interest.

Comparisons of some of these quantities per mile of railroad are still more striking.

Per Mile of Railroad.

	1891.	1883.	Dec.	P. c.
Stock	$14,785	$22,314	$7,529	33.7
Bonds	22,147	24,110	1,963	8.1
Pass. miles	54,764	74,945	20,181	28.4
Ton miles	341,528	476,848	135,320	28.4
Gross earnings	$5,282	$8,023	$2,741	34.2
Working expenses	3,509	3,927	418	10 6
Net earnings	1,773	4,096	2,323	56.7
Fixed charges	1,289	1,500	211	14.0
Profit from traffic	484	2,596	2,112	81.4
Stock and bonds less investments	30,746	38,380	7,643	20.0

It hardly seems as if the figures for 1891 and 1883, here given, could be for the same company. It is true that a very large part of the mileage now is of new railroad, whose traffic is likely to grow, but that was true also in 1883. The share capital per mile has been largely decreased, no shares having been issued since 1884 and the new lines having been built with bonds at a smaller rate per mile and a lower rate of interest than the bonds outstanding in 1883. The average density of both kinds of traffic is 28¼ per cent. less than in 1883 and equivalent to daily movement in both directions of 75 passengers and 468 tons of freight, against 103 passengers and 653 tons in 1883. The net earnings have fallen from $4,096 to $1,773, and the profits (from operation) over fixed charges from $2 596 to $484, more than four-fifths. This does not include the income from investments, land grant, etc., which were large in both years, but largest in the earlier one.

The statement of the stock and bonds per mile less the investments would be more significant if these investments ordinarily yielded a revenue equal to a fair interest on the investment, which they have never done but once—last year. Usually they have returned directly little more than 2 per cent. So far the chief purpose served by these investments has been to secure a certain important through traffic to the Chicago, Burlington & Quincy.

With its present large mileage, an addition of $150 in the net earnings per mile of this railroad is equal to $1 per share; and therefore a not very great improvement may materially increase dividends. But of course the reverse of this is true also. Last year the fixed charges absorbed nearly three-fourths of the net earnings; in 1883 about three-eighths. Moreover, its divisible profits are now affected to a considerable extent by those of the controlled lines, also a very narrow margin, likely to vary greatly from year to year, and last year contributing no less than $1.71 of the total $5.34 of profits per share.

We have seen that while the traffic of this railroad system has increased but moderately, in comparison with the great increase in its mileage, and the gross earnings still less, the working expenses have grown largely. It is, of course, impossible to work 5,000 miles of railroad as cheaply as 3,000, even if the traffic is no greater on the larger than on the smaller system; but in this company's case it is noticeable that certain parts of the expenses have increased very little, and the rest of course so much the more. Below we give the maintenance expenses (repairs of track, fences, bridges, buildings, cars and locomotives) and the other working expenses separately for each of the last nine years:

Year.	Repairs.	Other exp.	Year.	Repairs.	Other exp.
1883	$5,882,487	$7,613,991	1888	$6,664,737	$12,217,723
1884	5,564,507	8,526,239	1889	6,152,279	11,538,269
1885	6,146,122	8,259,645	1890	6,360,747	12,388,952
1886	5,861,718	8,627,965	1891	6,407,359	12,141,899
1887	6,580,047	9,517,866			

Since 1885 with an increase of 50 per cent. in mileage the maintenance expenses have increased but about 4 per cent., while the other working expenses have increased 47 per cent. It is as if there had been no expenses for the maintenance of 1,700 miles of additional road. A reduction of these from $1,680 to $1,212 per mile has been made, and it must have been made largely by reducing the amount of work done. This does not imply a neglect of maintenance in the later years: that might be done for a single year, but it would soon compel still greater expenditures, and the total for a series of years would be made larger instead of smaller; but it indicates that in the old days of great prosperity important and costly improvements were charged to maintenance and that this is no longer done. This is all proper enough, but it indicates that the decrease in the profitableness of this property has been greater even than is indicated by the falling off in net earnings.

Below we give the cost of car repairs *per car*, of locomotive expenses *per locomotive*, and of all other repairs *per mile of railroad* for the last nine years:

Year.	Car repairs per car.	Loco. repairs per loco.	Other per mile.
1883	$62.46	$1,779	$1,125
1884	6 .45	1,685	985
1885	59.16	1,821	1,046
1886	49.90	1,532	905
1887	56 53	1,591	979
1888	$58.23	$2,011	$765
1889	62.75	1,838	623
1890	52.38	1,703	691
1891	57.65	1,684	653

Car and locomotive capacity have been growing greater in recent years, and we should expect the bigger vehicles to cost something more for maintenance; but it is not the custom of this company to be behindhand in adopting improvements, and doubtless in the earliest of the years for which we have given figures its cars and engines already had a high average capacity. And the cost of maintenance per car has been quite even, and that for locomotives has been rather larger since than before 1888. The exceptional cost of locomotive maintenance in that year was doubtless due chiefly to the transfer of the whole stock from a long-trained and picked force of enginemen to men new to the road—and perhaps partly to the "emery and soap" which were recommended by some of the strikers' friends.

The reductions in the other maintenance expenses, repairs of track, bridges, buildings, fences, docks and levees, have been astonishingly great. For the five years previous to 1888 they averaged $1,080 per mile; for the three years since, $658. Track repairs, much the largest item, were nearly a tenth greater in 1883 for 3,255 miles of road than last year for 5,285. Track repairs separately per mile have been for the nine years:

1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
$904	$761	$797	$752	$734	$562	$454	$506	$508

All of this illustrates forcibly and painfully the risks to which the solidest and most carefully managed railroad properties are subject in a country in which an unlimited construction of competing lines is permitted and encouraged, and the only effective means of maintaining reasonable through rates is prohibited by law. It also suggests that the investment of a part of the profits of prosperous years in improvements, instead of dividing them all, may become a much needed defense in times of adversity. If the Burlington had to pay interest on the $30,000,000 of profits it has spent on its property, its margin for dividends would have been very small for the last four years, and its credit and consequently its ability to borrow the new capital which is needed every year would doubtless have been much less than they are.

Resistance Due to Parallel Rods.

The internal resistance of locomotives as affected by parallel rods and coupled wheels is brought forward on every occasion when higher speeds are talked of; but it is noticeable in every case that those who use this objection to coupled engines at high speed are persons who are much in favor of two driver locomotives. It is, of course, impossible to calculate just what is the exact amount of the internal resistance of the locomotive due to a parallel rod connection, when the wheels are not of exactly the same diameter, but the same is true of almost any other force or resistance in practical mechanics. Exact calculations are almost impossible; but the limits of forces and resistances are generally calculable, and should be always well understood before one attempts to draw conclusions.

Take this case of parallel rod resistance, for instance, as one for which the upper limit can readily be determined and calculate the upper limit of the resistance which will be added to a locomotive by a parallel rod connection when the drivers are of different diameters. An eight-wheeler with four, seven-foot, coupled drivers, having 20,000 pounds on each wheel or 80,000 pounds on four drivers is a modern heavy type. As an extreme limit, let us assume that one pair of drivers is ¼ in. smaller in diameter than the other pair to which it is coupled. This is such a high limit of difference in diameter that its existence on a locomotive would be inexcusable. During a full revolution the difference in the circumference of the wheels, namely, ¼ of an inch, must be made up by the slipping of the drivers to that amount on the rail. It will make no practical difference in the amount of the resistance whether one pair slips the entire amount or whether it is divided equally between the two pairs. The maximum increase of resistance due to this difference in circumference is readily calculated. The maximum friction of a locomotive driver on a rail is about 600 pounds per ton. The weight on the drivers to be skidded is 20 tons for one pair through a distance of three-quarters of an inch, or 40 tons for both pairs through one-half that distance or three eighths of an inch. The resistance is the same in both cases. It amounts to $20 \times 600 = 12{,}000$ pounds. This resistance, acting through three-quarters of an inch, will require 750-foot pounds to overcome it, and this is the work that must be done per revolution of the drivers in order to overcome the resistance of the parallel rods with ¼ in. difference in the diameter of the drivers. In one revolution a 7-ft. driver will move through 22 ft. To do 750-foot pounds of work in 22 ft. will require a total resistance of 34 pounds; that is, the maximum resistance to the movement of an eight-wheeled locomotive weighing 40 tons on the drivers with one pair of drivers one-quarter of an inch smaller in diameter than the other, is 34 pounds. At high speed the pull of such a locomotive probably amounts to about 5,000 pounds; hence, 34 pounds additional to overcome the resistance of the parallel rod connection with ¼ in. difference in the wheel diameters is about 0.7 per cent.; surely not a prohibitive increase in power. The ridiculous side of the argument and the value of the use of such mathematics as are available now appear.

In starting a train it is necessary to have a large adhesive weight, and this weight must be utilized fully if the train is to be accelerated as rapidly as it need be in order to make schedule time in getting out of large cities where there are many crossings and perhaps some local stops to be made. Therefore, the useful adhesion of the drivers is doubled in the case of the engine assumed when the four drivers are coupled together. This large increase in useful capacity to accelerate trains, to haul trains up grades and through snow banks, is obtained by an increase in resistance of only 0.7 per cent. when the engine is running at a speed where the pull is reduced to 5,000 lbs. It is much less than this at slow speeds, as the power of the cylinders is greater; hence, we have taken about the maximum percentage of increased resistance. At starting, the pull of such an engine as we have assumed on the drawbar is about 20,000 lbs. Thirty-four pounds is but 0.17 per cent. Added to all this there is, of course, a slight increase in the friction of the parallel rod journals, but that cannot amount to much when the increase of pressure is such a small percentage as we have shown. So far, those who have objected to coupled drivers for high speed have not been able to give any positive proof, either mathematical or practical, of the inefficiency of such a connection, except it may be in the breakage of the rods. A speed may eventually be reached where the strain on the parallel rod produced by its own weight and centrifugal force will be greater than the rod can bear; but those who have made calculations of such stresses know that with drivers seven feet in diameter and a rod of proper section this point would not be reached until the speed is greater than 100 miles per hour.

The construction of a high-level drawbridge (24 ft. free above the water) where the New York Central & Hudson River Railroad crosses the Harlem River at 135th street and Fourth avenue, New York City, seems to be assured. The compromise bill agreed upon by the railroad and the city, after consultation with the property owners who objected to the plan heretofore proposed because it would close up 129th street, has passed the State Senate, and those interested regard its final enactment as certain. The nature of the change to be made in the approaches is briefly outlined as follows:

The track on the present bridge is about 8 ft. above mean tide. From this point southward the railroad, running in the centre of Fourth Avenue, falls by an easy grade to 125th street (half a mile), and thence southward the grade is ascending at about 40 ft. per mile to the tunnel, which begins at Ninety-sixth street. The transverse streets close to the river are cut in two by the railroad, or have foot bridges only. From 130th south to 116th street each cross street is carried above the railroad by a bridge. Here the natural surface rapidly falls and 113th and 112th streets go under the railroad, which is carried on iron bridges with solid floors. Then begins the masonry viaduct, with arched openings for the streets. For the mile from the river to 115th street, where the present line is below the level of the street, the new line will be about 14 ft. *above* the street, and will come down to the present grade at 106th street. The new tracks (four of them) for the most of this distance are to be carried on a steel or iron structure resting on three longitudinal rows of metal columns. This metal structure will probably extend from the river to 111th street. The bill provides that the floor of this roadway shall be solid, the plan to be adopted being doubtless that in use on a number of New York Central bridges, and which was described in the *Railroad Gazette* of June 27, 1890.

The railroad company proposed that the line should descend at about 48 ft. per mile from the river, at the new elevation, to 125th street, where the present grade would be reached. By the compromise plan the line will *rise* at about that rate, to 129th street; thence rise at about 14 ft. per mile to 116th street, going above all the transverse streets, which remain at their present level, and then descend at about 40 ft. per mile to 106th street. A new station will be built at 125th street (Harlem). It will be seen that the present walled cut from 130th street to 116th street, constructed at enormous expense 20 years ago, must be filled up to the natural level of the street and 15 bridges taken out. The bill provides that the work shall be carried on under the direction of a commission of five members, two of whom must be civil engineers, to be appointed by the Mayor of New York City, and the city is to pay $750,000 toward the cost. North of the river the descent from the high level bridge to the present grade will be comparatively easy. The only transverse streets of importance are Mott avenue and 138th street, which are not far from the river, and which are now crossed at grade. The track will be carried above these and then descend at about 45 ft. per mile to the present grade at about 149th street.

The complaint of Boston consignees concerning the freight rates from Chicago to that city, which, except on goods for export, are fixed at 5 cents per 100 lbs. higher than the rate to New York on grain and the principal other commodities, has finally been acted upon by the railroads, the Boston & Albany having asked the other roads interested to agree to a rule by which the differentials shall hereafter be computed on a mileage basis, the rates from Chicago to Boston by the shortest route to be made the same per mile as the rates from Chicago to New York by the shortest route. This will make a differential of about 3 cents where now it is 5. This controversy is an old one. It has been before the Interstate Commerce Commission, and has also been taken by some of the complainants before the United States Supreme Court. The five cent differential was established when grain rates were double what they are now, so that the proportionate difference between the rates to the two ports has come to be 20 per cent., whereas it was, when established, about 9 per cent. The shortest route from Chicago to Boston is figured out by the Boston & Albany as follows: Baltimore & Ohio, Chicago to Auburn Junction, 153 miles; Wabash, Auburn Junction to Detroit, 126 miles; Michigan Central, Detroit to Suspension Bridge, 227 miles; New York Central, Suspension Bridge to Rochester, 73 miles; West Shore, Rochester to Rotterdam Junction, 200 miles; Fitchburg, Rotterdam Junction to Boston, 212 miles; total, 991 miles.

Mr. W. A. Smith, Chief of the Department of Transportation Exhibits of the World's Columbian Exposition, announces that intending exhibitors of railroad materials, machinery and appliances, should make application for space as soon as possible. Applications already received in the railroad division call for over 200,000 sq. ft. of space, net. Foreign governments have asked for and been granted 73,000 sq. ft. for railroad, marine and vehicle exhibits. This includes Great Britain, 25,000 ft.; Germany, 20,000 ft.; Canada, 15,000 ft.; Austria, 10,000 ft.; Mexico, 3,000 ft. France, Belgium, Russia and other countries will want space, but have not yet formulated their requirements. Mr. Smith says that there will be large exhibits of conveying and freight handling systems of machinery. The leading railroad systems of this country will make large and expensive exhibits. The historical features will be numerous and instructive. Manufacturers generally have been prompt in making applications for space, and those who further delay are likely to cause themselves some disappointment.

The committee on tests of iron and steel, appointed by the Master Mechanics' Association, has commenced its investigations, and is pushing the work vigorously in order to complete the report in time for distribution before the convention. The delay has been caused by an unusual pressure of work on the members during the last six months, a hindrance which will be appreciated by railroad officers in the West. Mr. William Smith, chairman of the committee and Superintendent of Motive Power of the Chicago & Northwestern, has devised several original methods of testing materials which are being tried to determine their practical value. These tests are all simple. Those thus far made refer to boiler plates and stay bolts. The committee hopes to be able to provide a plan for testing stay bolts and firebox sheets, which will show what is the best material to use and give light as to the simplest way to test it. The committee will present considerable information about recent improvements in specifications and the best methods of drawing up such documents. Blue shortness in metals is being thoroughly investigated by various tests applied to different kinds of steel and iron, heated in a furnace well adapted to adjust the temperature to any desired degree.

Law and common sense are often at variance, and the twelfth case in our railroad law column to day is one which illustrates one of the thousand ways in which the technicalities of the law often thus result. The case is one that came up under the comparatively new Massachusetts law which was passed with a view to favoring employés as against employers, the principle being the same as that of the English law of 1880. In this particular instance the intention of the law plainly was that the brakeman should have the benefit of the doubt; in short, should be favored; but the court dashes his hopes to the ground by deciding that a foreign car, on its way home empty is practically different, so far as it affects the relations between the company and a brakeman, from a car which is being used in actual freight service; whereas of a thousand clear-headed and intelligent railroad men, officers or trainmen, at least 999 would be very sure to decide that the conditions were practically *not* different. Yet the judge took what may be called a fair, common-sense view; that is to say, probably 999 judges out of a thousand would agree with him.

The Illinois Central has received the compound Wootten suburban engine which was illustrated in the *Railroad Gazette* last week. The engine has been put into suburban service and will be thoroughly tested. It will be tried with all the different kinds of fuel that a Wootten boiler is adapted to burn, and that is almost anything, and in various kinds of service. Extensive scientific tests will be made under all the conditions of service with the several kinds of fuel. The apparatus used will be complete, including water meters, pyrometers, calorimeters, speed recorders of special design, indicators, vacuum gauge, etc. The tests are being arranged for by Mr. Henry Schlacks, Superintendent of Motive Power, and will occupy some little time, but it is hoped that they will be finished in time for the report of the committee on compound locomotives at the next annual convention.

NEW PUBLICATIONS.

Master Car Builders' Association; Decisions of Arbitration Committee.

The decisions of the Arbitration Committee in the present series, from No. 1 to 110, inclusive, have been reprinted and bound together in pamphlet form, and sent to members, in numbers equal to the number of votes each member has in the association. Additional copies can be procured from the Secretary, Jno. W. Cloud, Chicago, at 25 cents a copy, until the supply is exhausted.

A prefatory note warns the reader that some of the decisions need to be read in the light of the fact that the rules on which they were based have been changed since the decision was made. There is an index at the end of the book, which is not very valuable, though it would doubtless be difficult for any one to get up a better one, the nature of the disputes being such that the construction of a succinct title is a hard matter in nearly every case. There are seven titles precisely alike, "Cards over six months old." A hasty glance at three of these decisions shows them to be practically all the same.

There is a large demand for this pamphlet and the supply will probably soon be exhausted. Several companies have ordered additional copies to be distributed among the employés, believing that a thorough knowledge of the nature of previous decisions will assist in settling disputes without appeal.

Transactions of the American Society of Civil Engineers, vol. XXV., July to December, 1891. 8vo., 728 pages, 117 plates. New York; published by the society.

This volume of the Society's transactions contains 36 papers treating of: The construction and economy of steamships and steam engines; chimney and machinery foundations on soft soils; stone quarrying; the conservation and distribution of water; irrigation and sewerage; ship canals; harbor improvements; cements; car wheels; strains and resistances in metals; draw and other bridges; railroad exploration; right of way; location, construction and economy. On an average somewhat

over four members discussed each paper presented to the society.

The range and value of the papers read before the society is continually increasing, with a corresponding increase in volume. In 1886 it was found necessary to issue the year's transactions in two volumes, and for 1890 the year's transactions covered 794 pages, illustrated by 158 plates, besides cuts inserted in the text, while for 1891 1,291 pages were issued with 181 plates—an increase of about 62 per cent. in reading matter.

TRADE CATALOGUES.

E. W. Bliss Company (Limited), Brooklyn, N. Y.—This concern, which makes a great variety of machines, tools and dies for working sheet metal, issues its very complete illustrated catalogue in sections, a plan which enables users to dispense with such parts as they do not care for, and permits revision by the publishers at any time. For the purpose of inclosing with letters, duplicate pages of the bound catalogue, as heretofore employed, were printed. This idea is now expanded, and these loose pages are used exclusively, the sheets being punched ready to fasten in a temporary binder with appropriate title page. Each page has been made complete. A customer who is interested, for example, in drop presses is not sent a book which has a few pages devoted to drop presses and all the balance to tools for which he has no use. Instead, he receives the pages illustrating the drop presses put up in a neat cover. If a machine is discarded it is withdrawn from the catalogue, and when a new machine or tool is prepared, a sheet describing it is at once printed and it is then included in the books as made up for distribution.

THE SCRAP HEAP.

Notes.

The New York & New England has made important discharges and reductions in pay in the general offices at Boston, and at some other points.

A train of 27 refrigerator cars on the New York, Lake Erie & Western ran from Deposit, N. Y., to Port Jervis, 90 miles, one night last week in 2 hours and 40 minuter.

The Maryland legislature has passed two prohibition bills "at the instance of railroad companies." They prohibit the sale of liquor at Brunswick, on the Baltimore & Ohio, and Parkton, on the Northern Central.

John Boyd, the negro charged with wrecking the Richmond & Danville passenger train near Statesville, N. C., in August last, causing the death of 22 passengers, escaped from jail at Charlotte, N. C., on the night of March 30.

The Grand Trunk, a number of whose conductors recently asked for additional pay, granted them an increase of 25 cents for each 150 mile trip, and each man is to have two complete sets of clothes annually, instead of one, as heretofore.

A mail train on the Georgia Pacific was "held up" at Weems, Ala., on the night of March 30, and some registered letters stolen. Some of the robbers remained outside and kept up a firing with their guns to keep the passengers quiet. The postal clerk was slightly injured.

The freight crews on the Philadelphia division of the Pennsylvania have been promised the Middle division wages for running over the Trenton cut-off. The engineers on the Middle division get $4.10 a trip; conductors, $3.60; flagmen, $2.70; firemen, $2.30; brakemen, $2.20: The run from Harrisburg to Trenton, over the Trenton cut-off, is about 125 miles. The Middle division is 132 miles long.

William Lankford was sentenced at Brazil, Ind., on March 31, to four years in the penitentiary for burning the new Evansville & Indianapolis passenger station at Clay City, Ind., several weeks ago. Lankford says he was hired by a certain wealthy citizen of that place to commit the crime, and the latter has been placed under arrest. The building was burned because its location was objectionable to a portion of the residents of the place.

Spanish American Notes.

The only break in the Trans-Andine Railway is that between Rio Blanco, Argentine, and Juncal, Chili, a distance of 70 miles, which is traveled by mule in 1½ days.

The Merida & Peto Railroad in Yucatan is within a short distance of Tekax, an important centre of sugar production, to which point it will be completed in six months.

Three grain elevators, having an aggregate capacity of 26,000 tons, have just been completed at Rosario, Argentine, and another large elevator has also been erected at Buenos Ayres.

Regular lines of steamers have just been started upon the Rios Sindú and Atrato in the Colombian states of Bolivar and Cauca respectively. The freight traffic was large from the beginning.

The accounts of the Buenos Ayres Great Southern Railway for 1891 show a balance of $638,650 after providing for interest on bonds, and all charges for extensions. The receipts for the week ending March 13 were $20,000 in excess of those for the same week of 1891.

The development of the petroleum fields in Peru has been so great that it has become necessary to lay pipe lines from the wells to the coast. It is stated that the output of these wells will soon supply the entire demand of the west coast of South America.

The National Railroad Board in Argentine has decided that the railroads are responsible for delays and damages to goods in transit, and has ordered the railroad companies to omit the clause exempting themselves from such responsibility in future "guias" or way bills.

The Brazilian Great Southern Railway shows an increase of receipts from Jan. 1, to March 15 of $19,000 over the corresponding period last year. The Recife and São Francisco Railway for three weeks showed a gain of $12,000, while the São Paulo Railway, with only 86½ miles of track, made a gain of $88,620 from Jan. 1 to March 15 over the receipts for that period in 1891.

A recent communication from William F. Shunk, chief engineer of the Intercontinental Railway Commission, states that his surveying party, which started from Quito, Ecuador, is now working its way down the Valley of the Cauca in Colombia, having come the entire distance "on railroad ground." He says further, "The Nudo de Cajas near Ibarra (Ecuador); the Alto de Boliche in the vicinity of Tulcan (Ecuador); the summit of Santa Gertrudis, named by ourselves as the discoverers, on the flank of La Galera south of Pasto (Colombia); the broken region supposed to be impracticable, north of the city last named, including the thwart, abysmal valleys of the Rios Juanambú and Mayo, divided by a formidable cordiliera, where also we found a new way; and the intricate topography to the southward of Popayán (Colombia), which connects the eastern and western ranges of the Andes; all have been traversed with a careful survey which demonstrates the feasibility of a road from Quito hither at moderate cost. This covers that portion of the Inter-Andine Upland heretofore regarded as the most difficult."

Stroking the Fur the Wrong Way.

A London correspondent sends us a note relating an incident which reminds us of certain occurrences in past ages in this country. Possibly some of our readers in the passenger department can recall cases of the kind, even in modern times. Here is the note:

The managements of the various English roads seem to be afflicted in turn with a sort of fatuous imbecility of roguery, which variously displays itself. The latest example of the disease has occurred with the Great Northern. This company, which on the whole has not been a bad line to its passengers, lately set forth an idiotically stringent set of rules for the regulating of its season ticket business, which are too lengthy to quote *in extenso*, but which amounted to a demand that every season ticket holder should sign an agreement to the effect that when he had paid for his year's ticket the company reserved the right of withholding the ticket, canceling it or otherwise prohibiting its use, when or how it pleased them, and without refunding the money paid. Needless to say, every clause of the agreement was contrary to the common law of England, and no court would have sustained the company in any action on the matter; but obviously the ticket holders resented the insolence, and it was resolved to boycott the line. In Leeds, where one meeting was held, there are five railroads competing for traffic, and every ton of goods that could be diverted from the offending company was so diverted to the other lines. In their lunacy, the directors had overlooked the fact that the ticket holders were also the chief freighters. In London, also, there were resolutions to boycott. The writer cut off several hundred passenger miles, and a good many ton miles also, for his share; and the result was so quickly felt in the freight yards that the objectionable circular was withdrawn, and the company had to climb down generally.

Ten Commandments to Switchmen and Brakemen.

First.—Don't take hold of a link to couple cars with a wet glove or mitten in frosty weather. If you do, it will stick to the link and your fingers will suffer.

Second.—Don't take hold of the head of a pin in a drawbar with your fingers back of the pin, or between the pin and the dead wood. If you do, and the pin is crooked or the draft iron is driven back far enough, your fingers may get nipped.

Third.—Don't go between cars to couple them where the load (logs, lumber, poles, or railroad iron) projects over the end of a car. If you do you may get crushed.

Fourth.—Don't attempt making a coupling between cars moving with force where the lug has been broken off the drawhead, without taking into your calculations that the drawhead is liable to be driven under the car. If you do, you are liable to have your hand taken off or get yourself crushed.

Fifth.—Don't swing and throw your whole weight on a brake wheel on top of a car, without knowing that the nut is on top of the brake rod. If you do, you and the brake wheel may take a tumble together, and the consequences will be more serious for you than for the brake wheel.

Sixth.—Don't step with the heel of your boot on a frog or on switch rails that are close together before or between moving cars. If you do, the frog or rails are liable to hold your foot as in a vise, and the moving wheels have no mercy.

Seventh.—In coupling freight cars where one car is higher than the other, always have the link in the highest draft iron; you will then not have to hold the link up, and the link will in a measure guide itself.

Eighth.—In coupling cars on a curve always stand on the outside of the curve; then, if anything gives way, or the load shifts on a flat car, you stand a better chance of escaping a squeeze.

Ninth.—If you think cars that are to be coupled up are coming together with too much force for safety, keep out and let them strike. It is much better for you to be called a "tenderfoot" than to lose some of your limbs.

Tenth.—In coupling a coach with a Miller coupler to a car with a common drawbar, always have the link in the Miller coupler, as the link is not near so likely to slip past the drawbar as it is past the Miller coupler. Make the same rule in coupling an engine to a Miller coupler; take the link out of the tender and put it into the Miller before backing.

Terminals at Duluth.

On account of the location of Duluth and the lay of the land surrounding that city there is no way of building a railroad into it except by following the shores of the lake or of St. Louis bay. Now that the canal separating Minnesota Point from the main land is to be bridged, the Duluth Transfer railroad, the Duluth, Red Lake Falls & Northern and the Duluth Terminal Improvement Co. are all clamoring for franchises which will enable them to use Minnesota Point for terminal facilities. Two other roads are asking for right of way into the city, and it is more than probable that it will be granted to them. They are the Duluth & Winnipeg and the Duluth, Messabe & Northern and the franchises will be conditioned upon each of these roads locating its general offices, shops and terminal docks within the limits of the city.

The village of West Duluth has granted a right of way 50 ft. wide, across all streets, avenues and alleys, one-third to be used by the Duluth, Messabe & Northern, one-third by the Duluth & Winnipeg and the other third to be held for an unnamed company.

Opening of the Sisseton Reservation.

In the northeastern corner of South Dakota there is shown upon the maps a large triangular piece of land, extending from near Watertown, S. Dak., north 72 miles. Part of the base line of the triangle, which is 43 miles in length, is in North Dakota and a considerable portion of the land is at the head of the Red River Valley. The land is said to be excellent for grazing and agricultural purposes, and of the 942,720 acres forming the reserve about a quarter of a million acres have been taken by the Indians in severalty, leaving nearly 700,000 acres which will be thrown open to settlement on April 15. In order to secure a claim a settler must locate on the land, comply with the requirements of the Government as to residence and improvements for 14 months; at the expiration of that time he may "prove up," pay the government $2.50 an acre and obtain a patent to 160 acres of the land. Preparations are already being made for the rush which is sure to be made for the land; and, as the marks of the original survey have been almost entirely obliterated, it will be impossible for a stranger to obtain a description of the land or to know which has been taken by the Indians. The locating companies which have sprung into existence will reap rich benefits, as they are in position to sell the settlers this information. Several railroads will build across the reservation this year, and the distance to the markets of the Northwest being comparatively short, a low rate of freight for produce is assured. Two of these roads are already making preparations for commencing work; they are the Chicago, Milwaukee & St. Paul and the Great Northern. A third road, the Watertown, Sioux City & Duluth, is now completing its survey, so there is promise of ample railroad facilities. In the meantime the roads reaching the borders of the reservation are doing a heavy business, as each train is bringing prospective settlers, and the merchants in the border towns are purchasing heavy stocks in anticipation of the demand for supplies following the opening of this land for settlement.

Scour Your Coat and Brush Your Buttons.

That the "personal equation" is still all powerful, even in a great corporation, continues to be illustrated every day. That railroads are still run very largely on the familiar lines of old times is often observable, and we give an instance below, the item being taken from a (very) Western paper. We disguise the names:

Division Superintendent A., of the X., Y. & Z., is mending his fences. Not his political nor yet his professional fences, but the plain, everyday fences that line the yard and try to keep the small boy from under the wheels of the trains on Mr. A.'s division. A spasm of cleanliness has also struck the ——— yard, and the shake has been severe. Never but once before in the history of the western division has there been such a demand for renovating supplies, gallons of whitewash, bars of soap, cases of brushes of all kinds, boxes of stove polish and other supplies of a like nature as have been sent out from one end of the western division to the other, and all because the president of the road is due here in something less than a week. . . . A whitewash brush, a package of whitewash, a scrubbing brush and a package of stove polish have been sent to every station agent on the division, with instructions to use them liberally. The old station stoves, most of which have been innocent of anything save a coating of rust for their entire life, will receive careful attention.

LOCOMOTIVE BUILDING.

The Cleveland, Cincinnati, Chicago & St. Louis has issued specifications for about 60 locomotives. The orders were to have been given out this week.

The Louisville, New Orleans & Texas has recently ordered 10 Mogul locomotives.

The order of the Great Northern for 56 heavy locomotives was secured by the Brooks Locomotive Works.

The Saltair railroad of Salt Lake City is negotiating for four new locomotives, and has recently ordered its first engine from the Rhode Island Locomotive Works.

The Schenectady Locomotive Works have orders for ten 10-wheel engines for the Chicago & Alton, and for three consolidation engines for the Fall Brook Coal Co.

The recent Wabash order placed with the Rhode Island Locomotive Works is for 25 engines and includes 12 eight-wheel passenger, eight 10-wheel freight and five 6-wheel switching locomotives.

The Baldwin Locomotive Works have an order for 22 locomotives for the Missouri, Kansas & Texas. The order includes 12 engines for the Missouri, Kansas & Eastern, of which nine will be Moguls and three 8-wheel passenger engines. The Baldwin Works also have an order for three narrow gauge engines for the Antofogasta Railroad in Chili.

CAR BUILDING.

The Des Moines and Northwestern is having built by the St. Charles Car Co. three passenger cars and two baggage cars.

Permission has been granted by the court to W. H. Truesdale, Receiver of the Minneapolis & St. Louis, to purchase seven passenger cars.

The Ringland Bros. are having built by the St. Charles Car Co. a 60 ft. circus and advertising car, which is decorated in most magnificent style.

The Lafayette Car Works plant has been sold to a Lafayette syndicate for $30,500. The car works have been in the control of a receiver for some months, and the sale was under orders of the United States court.

The St. Charles Car Co. has nearly completed several of the new chair cars for the St. Louis & San Francisco. It is building 15 of these cars, which will be unusually beautiful and comfortable. They will be finished in mahoghany and equipped with the latest devices and the Scarritt chairs. Six baggage cars are also being built.

The Pennsylvania gave out contracts last week for 1,500 standard hopper gondola cars, as follows: Harrisburg Car Mfg. Co., Harrisburg, Pa., 200 cars; Allison Mfg. Co., Philadelphia, Pa., 350 cars; Lebanon Mfg. Co., Lebanon, Pa., 200 cars; Roanoke Machine Works, Roanoke, Va., 250 cars; Terre Haute Car & Mfg. Co., Terre Haute, Ind., 300 cars, and the Iron Car Equipment Co., Huntingdon, Pa., 200 cars.

The South Baltimore Car Works has an order for 850 new coal cars, to be used by the Baltimore & Ohio and the coal companies at Cumberland, Md. The George's Creek Coal & Iron Co. has ordered 150 60,000-lb. coal cars; Black, Sheridan & Wilson 100 60,000-lb. cars, and the Consolidation Coal Co. 150 50,000-lb. cars. The Baltimore & Ohio will take the remainder of the order. All the cars will be fitted with the Buckeye car coupler and a part of them with air brakes.

The equipment owned by the United States Rolling Stock Co. is to be sold by the Receiver, W. C. Lane. The sales are to be at Hegewisch, April 25; at Decatur, Ala., April 28; Anniston, April 30, and Urbana, O., May 4. The property to be disposed of consists of 45 box, 107

stock, 6 platform, 80 coal and 24 refrigerator cars, and two locomotives, at Hegewinsch; 50 gondola, 3 box and 28 refrigerator cars, at Decatur; 32 platform, 8 box and 9 refrigerator cars, at Anniston; 12 box, 11 platform and 20 stock cars, at Urbana; also 15 refrigerator cars at Harrisburg on May 6.

BRIDGE BUILDING.

Atherly, Ont.—The surveyors of the Grand Trunk were at Atherly recently and made surveys for a new iron railroad bridge to replace the present one, which is not considered strong enough for the traffic.

Baltimore, Md.—Proposals were opened last week for constructing the iron bridge over Jones' Falls on Douglass or Lexington street. The bidders and prices were as follows: Bartlett, Hayward & Co., $33,848; Campbell & Zell Co., $26,381; H. Ashton Ramsey, $26,983. The Campbell & Zell Co., being the lowest bidders, will get the contract. The amount appropriated was $35,000. The bridge, according to the plans furnished by Engineer Smith, is to have one span and is to be 80 ft. long and 70 ft. wide.

Clinton, Tenn.—The County Commissioners will let contracts for two iron bridges this week.

Everett, Wash.—The contract for the Pacific avenue bridge has been let to the San Francisco Bridge Co.

Fairmont, W. Va.—The Fairmont Development Co. is building a new steel plate girder bridge over Coal River to connect its lands with the town of Fairmont.

Knoxville, Tenn.—Grant Wilkins, of Atlanta, Ga., contractor for the construction of the steel bridge across the Tennessee River for the Marietta & North Georgia, has sublet the contract for building the piers, four in number, to Myers, Sullivan & Co., of Birmingham, Ala. The bridge will consist of two deck spans 210 ft. long and one through span 280 ft. long, and is to be completed by Oct. 1.

Lexington, Va.—The Lexington Development Co. is about to contract for the construction of a wire suspension bridge.

Wheeling, W. Va.—The prospects for building a street railroad bridge between Wheeling and Bellaire, which was mentioned in this department some weeks ago, are improving. Partial plans of a belt road have been discussed by local capitalists. The plan that meets the most favor is to build it in connection with the Wheeling Bridge Co.'s electric lines now in existence. It includes a line from Benwood, the present terminus of the Wheeling company's lines, to McMechen, and from there by way of a bridge to Bellaire and through that city to the upper end and across another bridge to the lower end of the city of Wheeling to connect again with the Wheeling company's line.

Wilmington, Del.—The Delaware Railroad will build a double track iron bridge over the Delaware & Chesapeake Canal at Kirkwood. The plans are being prepared for the bridge. It will cost $150,000. New iron bridges have been built over the Nanticoke River at Seaford and over the Christiana, near Farnhurst.

Woodstock, N. B.—The New Brunswick Legislature has voted $114,000 for the construction of a stone and iron bridge at Woodstock, N. B.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In New York the Supreme Court holds that a stipulation in a special contract for carriage of a horse at reduced rates upon certain risks being assumed by the shipper, and upon condition that the horse be valued at not exceeding $100, whereby it is agreed that, in case of loss "from causes which would make the carrier liable," its liability shall not exceed such valuation, limits to that amount the recovery of the shipper for the killing of the horse by the carrier's negligence.[1]

In Minnesota the consignees of a carload of grapes made demand for the same before their arrival. Defendant notified them that the car was delayed by an accident on the road. It arrived the same afternoon, when plaintiffs refused to receive the grapes, on the ground that they were damaged on account of the delay. The car was examined, reported in "bad shape," and an agreement was then made between plaintiffs and defendant by which the grapes were turned over to the former, to be disposed of on defendant's account, and defendant was to pay them the difference between the proceeds and the costs and charges for the grapes. The Supreme Court decides that a mistake of the agent in thinking the car was damaged by a wreck on the track was immaterial and did not affect defendant's liability.[2]

The Interstate Commerce law makes it unlawful for a carrier to issue bills of lading at rates different from those established and filed with the Commission, or to demand or receive freight charges variant from such established rates; and makes it penal for any person to knowingly obtain transportation at less than the regular rates in force at the time. Defendant agreed to carry goods from C., Ill., and deliver them to plaintiff at a point in Alabama on the line of the M. & B., with which road defendant had a joint tariff. The bill of lading called for $5.44 freight charges, but the M. & B. road refused to deliver the goods except on payment of $29.30, the tariff rate. The Supreme Court of Alabama holds that the plaintiff could recover the value of the goods, since it did not appear that he or the consignor knew of the tariff rate.[3]

In Illinois the Supreme Court rules that the fact that a railroad has located its line across certain land is *prima facie* proof that it is necessary for it to take that land for the use of its road.[4]

In Missouri the Supreme Court holds that an agreement executed by a railroad company as part consideration for the grant of a right of way, which recites that the land-owner is entitled to a free under-crossing under the bridge constructed by the company on her land, provided the bridge shall be "of sufficient dimensions to admit of same, and provided, further, that said company shall not be liable for any damage caused by reason of privileges being granted," is a part of the transaction by which the right of way was procured; and where the bridge affords a good crossing, and afterwards a dam is constructed for a reservoir which destroys the said crossing, the loss thereof constitutes a part of the damages which should be allowed in proceedings of condemnation for the reservoir.[5]

In Massachusetts, in an action by a railroad against a city for taking, for the construction of sewage-works, three acres of plaintiff's land, in which there was a large quantity of gravel, it was held that it is within the discretion of the court to refuse testimony as to the market price of gravel as merchandise, the cost of transportation, and the demand and supply, since the subject of inquiry was primarily the value of the land, and not the gravel.[6]

Injuries to Passengers, Employes and Strangers.

In West Virginia the Supreme Court rules that though the contributory negligence of a passenger will relieve the company of the duty to exercise that extreme care ordinarily exacted, it still leaves it liable for failure to use ordinary precautions for the safety of such passenger after his danger has been discovered, or brought to its notice, if by its use the injury can be avoided.[7]

In the Federal Court a passenger paid the price of an excursion ticket from Detroit to Quebec and return, and accepted from the company's agent, without reading it, what the latter represented to be such a ticket. The agent, however, inadvertently stamped upon the return coupon the word "Detroit" above the word "Quebec," instead of *vice versa*, as was necessary to make it valid. On the homeward journey the conductor refused to receive the ticket, notwithstanding the passenger's explanation, and the latter, having no means to pay the cash fare, was put off at a way station, and suffered much humiliation and inconvenience. The Court holds that he may recover damages for this injury beyond the mere price paid for the ticket.[8]

In Arkansas, the status of "chair cars" came before the court for the first time, and it is held (1) that where a railroad advertised generally that free chair cars would be run on its road, and specially that such cars would be run to F. W., it did not warrant the inference that such cars were free to all passengers under all circumstances, or that they were free at all except to those taking passage to F. W.; (2) that payment of first-class fare on a railroad train does not entitle a passenger to carriage in a car equipped with adjustable reclining chairs and lavatory and served by a special porter; (3) that from a passenger who rides in a chair car the company may demand extra compensation, when the train is supplied with cars furnished with the usual appliances for the accommodation of passengers entitled to first-class passage.[9]

In the Federal Court it is laid down that a foreman who is in charge of a gang of workmen engaged in construction work on a railroad, with full power to hire and discharge men, and direct them when and where and how to work, is a vice-principal, notwithstanding that he occasionally lends a hand in the actual manual labor.[10]

In Wisconsin a foreman with a gang of men was pushing a car over an uncompleted portion of track which lay at the foot of an embankment that was so near to the track in one place that a man could not pass between it and the car. When the car was about 14 ft. from this narrow place, and had been put in motion by the other men, plaintiff was ordered to push the car, and he took hold of it at the only available position left by the others, which was on the side next to the embankment, and he was crushed between it and the car. According to plaintiff's uncontradicted testimony he did not know of the narrow place. He was pushing the car up grade, and was looking down to secure a foothold, the ground being muddy. The Supreme Court holds that he was not guilty of contributory negligence.[11]

In Massachusetts the plaintiff was injured by reason of a defect in the brake wheel of a car not owned by defendant, and which was merely an isolated empty car, on its way to take its place in a train to be delivered to another road. The Supreme Federal Court decides that such car did not fall under the provisions of the laws of 1897, declaring that an employé has a right of action against his employer for injuries caused by reason of any defect in the condition of the ways, works or machinery connected with or used in the business of the employer.[12]

In Georgia a machinist in the railroad shop was told by the foreman to cut out with a chisel a screw which had become fastened, and in doing so the chisel blurred, causing a chip of steel to fly into his eye; the foreman had gone to get a tool for plaintiff to do the work with, but plaintiff, instead of awaiting his return, used a chisel which had been furnished him by defendant for other work, and which was not well tempered. The Supreme Court holds the railroad not liable.[13]

The Supreme Court of Minnesota holds that a railroad operating a line composed of several different companies is within the statute declaring that every railroad corporation "owning or operating" a railroad shall be liable to a servant for the negligence of his fellow-servants, except where the servant sustaining damages by reason of such negligence is at the time engaged in the construction of a new road.[14]

In Alabama the plaintiff was the head brakeman on a freight train running between two stations 17 miles apart, between which were four other stations from one to seven miles apart. His duty, when the train was proceeding along the line, was to attend to the brakes on the front cars, which could be performed only on the tops of the cars. When the train approached a station at which cars were to be left or taken on, it was his duty to turn switches, which could only be done on the ground, in front of the engine. While the train was proceeding from one station to another, plaintiff, who was at the time sitting on the cross beam in front of the engine, with his legs hanging over the cow-catcher, was injured by the collision of the pilot with a rail of a bisecting road. But for his position on the pilot he would not have been injured. The Supreme Court rules that he was negligent and cannot recover.[15]

The Supreme Federal Court of Massachusetts rules that where a woman, not a passenger, is injured while walking across defendant's station grounds and platforms, with the railroad's passive assent, by falling through a trap-door after dark, and the door is not a concealed peril, designedly laid, the railroad is not liable to her therefor, she being a mere licensee.[16]

In Michigan it is laid down that a railroad which has erected an over bridge for a farm crossing must exercise ordinary care to see or ascertain the condition of the bridge, and it is not entitled to notice of its condition, as a prerequisite to its liability to one who was injured owing to the fact that the bridge was out of repair.[17]

In Iowa an engine was running backward at a high rate of speed, and neither the engineer nor the fireman was looking out. They testified that the bell was rung. Plaintiff testified that he stopped and looked each way before crossing, but saw no cars, and that he could have heard the bell 50 yards had it been rung, but that he heard no bell. The Supreme Court holds the railroad liable.[18]

[1] Zimmer v. N. Y. C. & H. R. R. Co., 16 N. Y. S., 631.
[2] Grinnell v. Wis. Cent. Co., 50 N. W. Rep., 891.
[3] M. & O. R. Co. v. Dismukes, 10 South. Rep., 280.
[4] O'Hare v. C., M. & N. R. Co., 28 N. E. Rep., 923.
[5] C. S. F. & C. Ry. Co. v. Miller, 17 S. W. Rep., 499.
[6] P. & W. R. Co. v. City of Worcester, 29 N. E. Rep., 56.
[7] Carrico v. W. V. C. & P. Ry. Co., 14 S. E. Rep., 12.
[8] Poulin v. Canadian Pac. R. Co., 47 Fed. Rep., 858.
[9] St. Louis, A. & T. R. R. Co. v. Hardy, 17 S. W. Rep., 711.
[10] Woods v. Lindvall, 48 Fed. Rep., 62.
[11] Stackman v. C. & N. W. Ry. Co., 50 N. W. Rep., 401.
[12] Coffee v. N. Y., N. H. & H. R. Co., 28 N. E. Rep., 1,128.
[13] E. T., V. & G. R. Co., v. Perkins, 13 S. E., Rep., 952.
[14] Moran v. Eastern Ry. Co. of Minnesota, 50 N. W. Rep., 930.
[15] Warden v. L. & N. R. Co., 10 South Ref., 276.
[16] Redigan v. B. & M. R. Co., 28 N. Rep., 1133.
[17] Stewart v. C., W. & M. Ry. Co., 50 N. W. Rep., 852.
[18] Clampet v. St. P. & N. C. R. Co., 50 N. W. Rep., 673.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Berkshire, quarterly, 1¼ per cent., payable April 1.
Boston & Providence, quarterly, 1¼ per cent., payable April 1.
Central Railroad of New Jersey, quarterly, 1¼ per cent., payable May 2.
European & North American, semi-annual, 2½ per cent., payable April 1.
Norfolk & Western, semi-annual, $1.50 per share on the preferred stock, payable April 29.
New York & New England, semi-annual, 3½ per cent. on the preferred stock, payable May 2.
Pittsburgh, Fort Wayne & Chicago, quarterly, guaranteed 1¾ per cent., payable April 5, and also a quarterly special guaranteed dividend 1¾ per cent., payable April 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic Avenue Elevated, annual, New York, N. Y., April 19.
Central of New Jersey, Annual, Jersey City, N. J., May 6.
Central Pacific, annual, San Francisco, Cal., April 12.
Chicago & Grand Trunk, annual, Chicago, Ill., April 13.
Cincinnati, Saginaw & Mackinaw, annual, Saginaw, Mich. (East Side), April 19.
Delaware & Hudson Canal Co., annual, New York, May 10.
Harlem River & Port Chester, annual, Grand Central Depot, New York City, N. Y., April 9.
Lake Shore & Michigan Southern, annual, Cleveland, O., May 4.
Little Rock & Fort Smith, annual, Little Rock, Ark., April 28.
Long Island, annual, Jamaica, N. Y., April 12.
Michigan Central, annual, Detroit, Mich., May 5.
New York Central & Hudson River, annual, New York, N. Y., April 20.
New York, Chicago & St. Louis, annual, New York, N. Y., May 4.
New York, Ontario & Western, New York, N. Y., April 20.
Pittsburgh, Cincinnati, Chicago & St. Louis, annual Pittsburgh, Pa., April 12.
St. Louis, Iron Mountain & Southern, special, St. Louis, Mo., May 27.
St. Louis Southwestern, annual, St. Louis, Mo., May 4.
Southern Central, special, Philadelphia, Pa., April 12.
Traverse City, annual, Travers City, Mich., May 5.
Union Pacific, annual, Boston, Mass., April 27.
Union Pacific, Denver & Gulf, annual, Denver, Col., April 12.
West Shore, annual, Albany, N. Y., April 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Association (General Time Convention)* will hold its spring meeting at New York City, April 13.

The *National Association of Car Service Managers* will hold its next annual meeting at Philadelphia, Pa., April 27.

The *Association of Railway Accounting Officers* will hold its fourth annual meeting at the Auditorium Hotel, Chicago, Ill., May 25.

The *Master Car Builders' Association* will hold its annual convention at Congress Hall, Saratoga, N. Y., June 15.

The *American Railway Master Mechanics' Association* will hold its annual convention at Congress Hall, Saratoga Springs, June 20.

The *American Association of General Baggage Agents* will hold its next annual meeting at Mackinac Island, Mich., July 20.

The *New England Railroad Club* holds regular meetings, at the United State Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November. By special resolution the next meeting will be held in April.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings

in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

American Railway Master Mechanics' Association.

The annual convention of this association will meet at Saratoga, N. Y., on June 20. The headquarters of the association will be in the Congress Hall Hotel. Members expecting to be present should apply for rooms early. Applications should be sent to H. S. Clements, Congress Hall, Saratoga Springs, N. Y.

Master Car Builders' Association.

The twenty-sixth annual convention of the Master Car Builders' Association will be held at Congress Hall, Saratoga, N. Y., commencing on Wednesday, June 15. The Committee of Arrangements has secured a uniform rate of $3 a day for usual accommodations at this hotel, and applications for rooms should be addressed to H. S. Clements, Congress Hall, Saratoga Springs, N. Y.

National Convention of Railroad Commissioners.

Secretary Moseley has issued the call for the next national convention of Railroad Commissioners, to be held at the office of the Interstate Commerce Commission in Washington, April 13. The Railroad Commissioners of all states and state officers charged with any duty in the supervision of railroads or railroad interests are invited. The Association of American Railway Accounting Officers is also invited to meet with the Commissioners or to send delegates. Members are asked to notify Edward A. Moseley, Secretary, Washington, D. C., before the day of meeting, of any subjects they may wish to bring up.

The Engineers' Club of Philadelphia.

A regular meeting was held March 19, President James Christie presiding; about 40 members present.

Mr. Arthur Falkenau presented an interesting paper on the Cost of Power in Mexico and the Western Mining Regions. The author spoke of the opportunities for the introduction of machinery offered in the mining and cotton industries of Mexico, but efforts in this direction have not always been successful. "Numerous attempts have been made at replacing the Mexican method by machinery driven by steam, but in practically all cases it has been found advantageous to go back to the old methods. I do not believe that the invariable natural conditions can ever be changed, and Mexico can only solve the problem of the cost of power, which so greatly stands in its road to progress, by inviting external influences, by obtaining better intercommunication with other countries and cheaper coal." The Secretary read for Mr. A. L. Eltonhead a letter on the same subject which gave some figures of the cost of fuel on Mexican railroads.

The Secretary read for Mr. Alan N. Lukens a paper on "Cost of Errors in Transmission of Power," in which he cited numerous instances of errroneous transmission which had come under his observation.

PERSONAL.

—Mr. John Fagan, Master Mechanic of the Atchison shops of the Atchison, Topeka & Santa Fe, has resigned, after a service with that company of 20 years.

—The American Society of Civil Engineers has elected Mr. James B. Francis, Past President, an honorary member and Mr. F. Hopkinson Smith, an associate.

—Mr. F. Gilham, formerly General Manager of the Interoceanic Railroad, in Mexico, and recently Managing Director, resident in London, died in the latter city recently.

—Mr. John Russell Young, the well known journalist and ex-Minister to China, has been appointed Fourth Vice-President of the consolidated Philadelphia & Reading system.

—President John King, of the New York, Lake Erie & Western, who has been in Southern California for several months, expects to return to New York the latter part of this month.

Mr. James A. Elder, who has been President of the Emmettsburg Railroad and was General Manager before the lease to the Western Maryland, resigned his office at the annual meeting last week.

—Mr. Charles Bruff, of Brooklyn, N. Y., for several years Secretary of the Long Island Railroad, and the Manhattan Beach Improvement Co., died at Winter Park, Fla, March 30, in his 38th year.

—Mr. Channing F. Meek, formerly General Superintendent of the Union Pacific, Denver & Gulf, has recently been elected a director of the Colorado Coal and Iron Co., one of the largest concerns in Colorado.

—Mr. Andrew B. Uline, of Albany, N. Y., General Manager of the Hudson River Telephone Co., and for many years Albany Agent of the Merchants' Dispatch Transportation Co., died last Monday at Nassau.

—Mr. C. C. Colson, whose book on "Transportation and Tariffs" we noticed last September, has been appointed Professor of Political Economy in the French School of Bridges and Highways, to succeed the late Mr. Baudrillart.

—Mr. Alexander Mitchell, late Superintendent of the Wyoming Division of the Lehigh Valley Railroad, has been promoted to be Superin tendent of rolling stock, motive power and machine shops of the Northern and Eastern Division of the Philadelphia & Reading Railroad system.

—Ex-Governor George T. Anthony, of Kansas, was last week re-elected Chairman of the Board of Railroad Commissioners of that state. The report printed last week that he had been re-elected Railroad Commissioner of Missouri was an error. This will be Governor Anthony's fourth term as Railroad Commissioner.

—Mr. R. G. Taylor, formerly Superintendent of the Buffalo Division of the New York, Lake Erie & Western, died very suddenly at his home in Buffalo, N. Y., April 2, of heart disease. Of late years he had been a large operator and producer in the Bradford oil field, and built several narrow-gauge railroad lines in Pennsylvania.

—Gov. Tuttle, of New Hampshire, again nominated Col. Thomas Cogswell to be State Railroad Commissioner last Tuesday, and the appointment was confirmed by the Executive Council. The nomination of Colonel Cogswell was first made in April, 1891, but was then rejected by the Executive Council. The appointment has been made a number of times in the last year, but has always failed of confirmation by the Council.

—Mr. S. Y. McNair has recently been appointed Assistant Auditor of the East Tennessee, Virginia & Georgia. Mr. McNair is an able auditor and well known through his long connection with the New York, Lake Erie & Western as Chief Clerk in the Comptroller's department. He went to Chicago in 1889 as Auditor and Treasurer of the Interstate Commerce Railway Association, resigning in April, 1889.

—Mr. Timothy Hopkins, Treasurer of the Southern Pacific and the Central Pacific, resigned both those offices April 1. Mr. Hopkins was elected Treasurer of Central Pacific in 1883, and has been Treasurer of the Southern Pacific Co. since its reorganization, and a director. He was an adopted son of the late Mark Hopkins, and under the settlement of the will of Mrs. Hopkins Searles he receives a very large fortune.

—Col. Calvin Goddard died in San Francisco, Cal., April 4, in his 55th year. He was President of the Chicago & South Side Rapid Transit Railway (the "Alley" elevated railroad), and had gone to California to recuperate from an attack of the grip. Much of the success of the "Alley" railroad is due to Col. Goddard. We speak of its success, for the enterprise has now reached a point where its future cannot be in doubt. It is built on its own right of way, bought or condemned, and carefully guarded against claims for damages. The structure, track and stations are modern and thorough in design and construction down to the last detail. The same is true of the rolling stock now building. We mention these facts as illustrating some of the strong points of Col. Goddard's character. Thoroughness was almost a passion, and his work was carried out with singular energy, resolution and industry. He had the very rare gift of knowing and controlling details without meddling. He was a genial man, with an eager and liberal mind, which made him not only an agreeable, but a stimulating companion.

He had been Treasurer of the Wells-Fargo Express Co. and of the New York & New England Railroad, and was an officer of volunteers the first half of the war.

ELECTIONS AND APPOINTMENTS.

California Midland.—C. E. Ertz, of San Francisco, is the principal projector of this road, and will probably be chosen President. V. G. Bogue, of Chicago, has been appointed Chief Engineer.

Central of Georgia.—Daniel Curran has been appointed Superintendent of the Columbus & Western Division of this road. He formerly held this office, but after the lease to the Georgia Pacific the division was consolidated with the jurisdiction of W. B. Ryder, Superintendent of the Georgia Pacific mail line.

Frederick Cromwell, of the Mutual Life Insurance Co. of New York, has been elected a director of the company in place of J. C. Maben.

Chesapeake, Ohio & Southwestern.—The annual meeting of the stockholders was held at Memphis, Tenn., April 5. The following directors were elected: Charles Babbidge, I. E. Gates, Eckstein Norton, William P. Norton, T. C. Platt, William Mahl, of New York; John I. McHenry, of Hartford, Ky.; General John Echols, of Louisville, and Holmes Cummins, of Memphis.

Chicago & Alton.—The annual meeting of the stockholders was held April 4. T. B. Blackstone, John B. Drake and Morris K. Jesup, whose term of three years had expired, were re-elected. The Board now stands James C. McMullin, John A. Stewart, Albert A. Sprague, John J. Mitchell, W. N. Blackstone, A. C. Bartlett, T. B. Blackstone, John B. Drake and Morris K. Jesup. The following officers were re-elected: President, T. B. Blackstone; Vice-President, J. C. McMullin; Secretary and Treasurer, Charles H. Foster; General Manager, Charles H. Chappelle.

Chicago & Assiniboia.—Charles E. Bartoy, Byron Van Tuken, William E. Williams, Loyal W. Murphy and Nathaniel Otis, of Chicago, are the incorporators of the company.

Chicago, Lake Geneva & Northwestern.—De Clermont Dunlap, of Rockford, Ill., has been appointed President of this road. He is also President of the Rockford Terminal.

Chicago & South Side Rapid Transit.—E. B. Wetmore has been appointed Superintendent and Master Mechanic of the company. He has been Superintendent and Master Mechanic of the Suburban Rapid Transit lines in New York for several years.

Cleveland, Cincinnati, Chicago & St. Louis.—B. F. Coe, General Freight Agent of the Cincinnati, Wabash & Michigan, has been appointed General Assistant Freight Agent of the Michigan Division of this road. This is practically the same office, and his headquarters will remain at Elkhart, Ind.

Delaware, Lackawanna & Western.—William C. Swift has been appointed Assistant Auditor and Bertram Young Auditor of Freight and Ticket Account, with offices at No. 26 Exchange Place, New York.

Duluth Terminal Improvement Co.—The incorporators are F. W. Paine, J. C. Hunter, Michael Norris, S. L. Selden, Herman Burg, F. W. Kugler and C. A. Stewart, all of Duluth. The officers are F. W. Paine, President; Herman Burg, Vice-President; S. L. Selden, Secretary; J. C. Hunter, Treasurer.

Emmitsburg.—At a meeting at Emmitsburg, Md., March 30, the following directors were elected: Jesse H. Nussear, William H. Biggs, Christian T. Zacharias, James A. Elder, J. Hiram Taylor. This was the first election since 1885.

Fort Dodge & Northwestern.—The company has been incorporated in Iowa by Hamilton Browne, James G. Hubbell, Robert C. Garrabant and George L. Hodges, of Fort Dodge, Ia.

Galveston, Houston & Henderson.—At the annual election of the company, held at Galveston, April 6, a new Board of Directors was elected as follows: John T. Kane, Frank Lee, A. Berdash and W. P. Johnson, of Galveston, and R. B. Baer, S. J. Boyles and C. W. Gaines, of Houston. The directors organized by the election of John T. Kane, of Galveston, President; R. B. Baer, of Houston, Vice-President, and James Spillane, of Galveston, Secretary and Treasurer.

Great Northern.—E. W. Batchelder, Chief Clerk in the office of the General Superintendent, has been appointed Assistant Superintendent of the Fergus Falls Division, with headquarters at St. Cloud, Minn. He succeeds E. J. Evans, recently transferred to the Dakota division.

Gulfport.—The incorporators are: Allen Cox, Philadelphia; Robert L. Engle, James O. Porter, Samuel D. Reugler, John F. Follett, Joshua M. Dawson, Richard R. Coleman, of Cincinnati, O.

Indianapolis, Logansport & Chicago.—The following are now the officers of the company: Edward Talbot, President, 56 La Salle street, Chicago; E. G. Cornelius, Secretary and Treasurer, 89 West Market street, Indianapolis, and Walter A. Osmer, Chief Engineer, Logansport, Ind.

International & Great Northern.—At the annual meeting of the Board of Directors in Palestine, Tex., April 6, the following officers of the company were elected: President, Jay Gould; First Vice President, S. H. H. Clark; Second Vice-President, Henry B. Kane; Secretary and Treasurer, A. R. Howard; Assistant Secretary and Treasurer, P. B. Henson.

Missouri, Kansas & Texas.—Owing to the resignation of A. S. Dodge, Traffic Manager, C. Haile, General Freight Agent, will perform the duties formerly devolving upon the Traffic Manager in the freight department until further notice. Walter G. Graham, formerly General Ticket Agent, but now Acting General Passenger Agent, will have charge of the passenger department.

Lake Shore & Michigan Southern.—M. A. Zook has been appointed to succeed F. E. House, resigned, as Principal Assistant Engineer of the Lake Shore division, with headquarters at Dunkirk, N. Y.

Lockport & Northwestern.—The annual meeting was held in Lockport, N. Y., April 1. The stockholders elected the following directors: John Hodge, Eugene M. Ashley, Charles A. Hoag, Willard T. Ransom, Frank P. Weaver, Edwin L. Jeffery and William Spalding. The road is projected between Lockport and Olcott on the lake shore.

Louisville, New Orleans & Texas.—R. S. Davis, who has been Assistant General Freight Agent of the St. Louis, Arkansas & Texas, has been appointed General Agent of the Mississippi Valley route, with headquarters at Chicago.

National City & Otay.—The following directors were chosen at the annual meeting last week: Benjamin Kimball, Benjamin P. Cheney and W. L. Frost, of Boston; John E. Boal, W. C. Kimball, F. E. Prendergast and H. Gray, of National City, Cal. Mr. Kimball was elected President. The road is owned by the San Diego Land & Town Co.

Nelson & Fort Shippard.—At a meeting of the shareholders of this company, held in Victoria, B. C., Major Dupont, P. C. Dunlevy, G. B. Wright, H. S. Mason and C. G. Major were elected directors. Major Dupont was elected President of the board, Mr. Dunlevy Vice-President and Mr. Mason Secretary-Treasurer.

New York Central & Hudson River.—The organization of the freight department was revised on April 1, the road being divided, as already noted, into four freight divisions. The following appointments have been made: John R. Collins, Division Freight Agent of the New York Division, with office at Grand Central Station, New York City; Seneca Kelly, Division Freight Agent of the Syracuse Division, with office at Syracuse, N. Y.; Edwin H. Croly, Division Freight Agent of the Rochester Division, with office at Rochester, N. Y.

George E. Terry, Division Freight Agent of Buffalo Division, with office at Buffalo.

New York, Philadelphia & Norfolk.—At the annual meeting of the stockholders of the company at Cape Charles, Va., last week, the following directors were elected: A. J. Cassatt, U. H. Painter, John Keller, C. A. Griscom, William A. Patton, J. G. Cassatt, R. H. Townsend, Jr. A. J. Cassatt was elected President; William A. Patton, Vice-President; J. G. Cassatt, Treasurer, and William Cariss, Jr., Secretary and Auditor.

New York, Providence & Boston.—George B. Francis has been appointed Resident Engineer of this road and the Old Colony Railroad Terminal Co., with office at Providence, R. I.

Norfolk & Western.—At a meeting of the board of directors, held March 30, the appointment of Charles H. Mellon as Assistant to the President was confirmed.

Northern Pacific.—Fred. G. Prest has been appointed Assistant Purchasing Agent of the lines owned and controlled by this company, with headquarters at Chicago.

The construction department of the company has been removed from St. Paul to Chicago, with headquarters at the Grand Central station.

Ohio River.—The following appointments have been made: G. Clinton Gardner, General Manager; S. G. Reynolds, Commercial Agent, located at Louisville, Ky., and C. L. Williams, formerly Assistant Superintendent, to be Superintendent. The office of the company is at Parkersburg, W. Va.

Panama.—The annual meeting of the company was held at No. 29 Broadway, New York, April 4. J. H. Parker, President of the United States Bank, was elected a director in the place of the late D. A. De Lima, and General Franklin to succeed the late Louis de Bebian. The other directors were re-elected as follows: John Newton, Charles Coudert, Julius W. Adams, Robert A. Chesebrough, E. A. Drake, Ernest L. Oppenheim, Samuel R. Probasco, J. Edward Simmons, D. Lowber Smith, Samuel M. Felton and Xavier Bayard.

Pennsylvania.—C. F. Perkins has been appointed Division Freight Agent of the Cleveland & Pittsburgh Division, with headquarters at Cleveland, O. H. N. Bradley, Agent of the Erie & Ashtabula Division, succeeds him as Division Freight Agent of that division, with headquarters at Erie, Pa.

Philadelphia & Long Branch.—At the annual meeting held at Camden, N. J., April 4, the following board of directors was elected: William H. Wilson, Henry D. Welsh, J. N. DuBarry, G. M. Dorrance, F. W. Jackson, W. J. Sewell, M. F. Middleton, Hugh B. Ely, N. P. Shortidge, James R. McClure, Lewis Perrine, Jr., A. O. Dayton, Frank Elmaker. The Board elected W. H. Wilson, President; James R. McClure Secretary, and John M. Wood, Treasurer.

Philadelphia & Reading.—The following appointments are announced: O. C. Briggs Assistant to the General Passenger Agent, with office at 227 South Fourth street, Philadelphia, and R. F. Reaver, Division Passenger Agent, Main Line and Williamsport Divisions, with office at 227 South Fourth Street, Philadelphia.

Oscar O. Esser, formerly Trainmaster of the Wyoming Division of the Lehigh Valley, has been appointed Superintendent of the Division to succeed Alexander Mitchell, who has been appointed Superintendent of Motive Power.

Pittsburgh, Shenango & Lake Erie.—At the annual meeting of the company, at Greenville, Pa., April 5, the following officers were elected: President, Samuel B. Dick; Vice-President, A. C. Huidekoper; Secretary, P. E. McCray; Treasurer, Daniel Moore. The old board of directors was re-elected.

St. Lawrence & Adirondack.—A. C. Allison, formerly General Freight and Passenger Agent of the Northern Adirondack, has been appointed Superintendent of the Malone & St. Lawrence and the St. Lawrence & Adirondack, between Malone and Valleyfield, Que., which has been recently operated by the Central Vermont.

St. Louis Southwestern.—A. S. Dodge, formerly Traffic Manager of the Missouri, Kansas & Texas, has been appointed Freight Traffic Manager of this road, with headquarters at St. Louis. He succeeds L. P. Day, recently resigned to accept service with another company.

Southern Pacific.—The annual meeting occurred in San Francisco April 6, and the following Board of Directors was elected: C. P. Huntington, Leland Stanford, Charles F. Crocker, Thomas E. Stillman, Thomas H. Hubbard, A. N. Towne, J. C. Stubbs, E. H. Miller, Jr., S. T. Gage, H. E. Huntington and George Crocker. The two last named are new directors, succeeding W. V. Huntington and L. V. Brown.

Tiffin & Northwestern.—The following directors were elected at a recent meeting at Toledo, O.: G. W. Layng, Frank Janes, Toledo; Thomas D. Messler, James McCrea, Joseph Wood, J. W. Renner, Pittsburg; R. F. Smith, Cleveland.

Tionesta Valley & Hickory.—The following directors have been elected for this new company: T. D. Collins, Nebraska, Pa., President, and Everett S. Collins, Kelso, Cowlitz County, Washington; Orion Siggins and Alice W. Siggins, West Hickory, Pa.; James Henderson, East Hickory, Pa., and Mary S. Collins, Nebraska, Pa.

Unadilla Valley.—The present officers of the company are: George H. Scott, President; Ralph Brandreth, Vice-President; F. F. Culver, Treasurer; R. F. Clarke, Secretary, and D. E. Culver, Chief-Engineer. The address of all is 80 Broadway, New York City.

Velasco Terminal.—M. P. Morrisey has been appointed General Traffic Manager of the road.

Washington Southern.—At a meeting of the stockholders of the company, held in Alexandria, Va., April 5, the following were elected directors: J. N. Du Barry, John Cassels, J. S. Leib, George C. Wilkins, J. P. Kern and Andrew Jamieson. Mr. Du Barry was elected President.

Western & Atlantic.—C. E. Harman, who has been General Passenger Agent of the road, was appointed General Freight Agent on April 1, in addition to his other duties. J. L. Dickey, formerly General Freight Agent, was appointed General Agent at Atlanta. He succeeds A. G. Jackson, recently appointed General Freight and Passenger Agent of the Georgia road.

Western New York & Pennsylvania.—At a meeting of the Board of Directors of the company in Philadelphia, April 1, Edward T. Steel was elected a Director of that company.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—The contractors are still hampered in their work on this road through the Adirondacks by heavy snow drifts, but they will soon be able to work with more advantage. The track is being laid by the company, but this work also is proceeding slowly. The greatest progress is being made on the northern end of the line, and the track south of Malone, N. Y., has now been laid for about 20 miles.

Baltimore & Ohio.—The company has had a party of engineers at work on a new short line from their main line in the vicinity of Fairmont, W. Va., to the Pawpaw coal fields. The line as surveyed will be about 12 miles in length and keeps well up above the line of the West Virginia & Pittsburgh road, which takes the same general direction.

An agreement for the extension of the Somerset and Cambria branch from Johnstown, Pa., into the bituminous coal fields of Northern Cambria County, is reported to have been concluded with the Cambria Iron Co.

Bellefonte Central.—The company has recently completed the section between Bellefonte, Pa., and the Pennsylvania State College, near that town, the first trains being run over the new line last week. Arrangements have been made for a further extension of the road. Robert F. Frazer, of Philadelphia, is President.

Burrard Inlet & Fraser Valley.—The projectors of this company recently applied to the City Council of Vancouver, B. C., for a subsidy of $300,000, and the council last week decided to order an election on the proposition. The company agrees to begin construction work within a month on the line between Sumas, Wash., near the international boundary line and the Fraser River, and to complete the line into Vancouver next year, expending about $200,000 in building the terminals at that town. The directors state that the Northern Pacific has agreed to operate the line when it is completed.

California Midland.—C. E. Ertz, of San Francisco, the contractor for this road, states that the recent charter only provided for a temporary organization, and that new directors are to be elected in a few weeks. When this is done the surveys will be made from Stockton through the San Joaquin Valley to Visalia, passing through Fresno. It is expected that a nearly direct line can be obtained for a route east of the main line of the Southern Pacific, through the valley but nearer the foot hills.

Canadian Pacific.—Contractors J. J. Egan & Co. will this season finish up their work on the line to the Souris coal fields beginning operations in a very few days. Contractor Dennison, who has eight or ten miles to complete on the Deloraine branch will also start immediately.

Carrabelle, Tallahassee & Gulf.—J. H. Davidson & Co., of Curtis Mills, Fla., state that their contract on this road is to complete the grading and bridging on the first 10 miles from Tallahassee, Fla.

Chicago & Assiniboia.—The articles of incorporation of this company were filed in Iowa this week. W. E. Williams, one of the incorporators, says the directors are not prepared to give the exact route of the road, further than to say that the line has been surveyed from Chicago to the Mississippi River, a distance of 130 miles, and it is projected from that point to Big Stone Lake, on the dividing line between Minnesota and the Dakotas, a distance of 420 miles.

Chicago, Milwaukee & St. Paul.—Several contracts have recently been let for double track work on the Chicago & Milwaukee Division. A contract for 11 miles, commencing at Barr, about 17 miles from Chicago, has been let to Kimball & McNamara, of Sioux City, and a contract for 16 miles on the northern end of the division has been let to R. B. Langdon, of Waukegan, Ill. This second contract is between Lake and Western Union Junction, 23 miles from Milwaukee, and will complete a continuous section of double track from the city to that point.

Chicago, Rock Island & Pacific.—The tracklaying on the extension being built south of Minco, I. T., has been completed for about 15 miles south of that town to a point a few miles beyond Salt Creek, near the Washita River. The contractors are constantly increasing the forces at work on the extension and it is claimed that about 3,000 men are now employed on the line through the Indian Territory. The last contract which has been let for grading ends at Flat Creek, about 10 miles north of the Red River and it is not proposed to let any additional contracts until the point of crossing the Red River has been decided. If the work is not delayed the track will probably be laid as far as the Red River by July 1 and connection will be made with the roads in Texas in August. The engineers passed through Bowie, near Henrietta, last week and they are now surveying toward Springtown and Fort Worth.

Columbia & Maryland.—A bill has been introduced in the Maryland Legislature amending the charter of the company, and providing for a road from Washington, D. C., to Laurel, and thence to the Pennsylvania line, with branches. The capital stock is $500,000.

Concord & Montreal.—A preliminary survey has just been made for a short branch of the line now being built between Jefferson and Gorham, N. H. The branch will be about 3½ miles long and will extend from Jefferson to the Waumbek House. The location for the new line is to be made at once, but the time for letting the contracts is uncertain.

Dardanelle & Mount Nebo.—The construction of this line, the contract for which was recently awarded, has not yet been commenced and it is now probable that no work will be done this season. The General Manager writes that the work has been postponed principally because the final estimates of the cost of building the line from Dardanelle, Ark., with the 1,300-ft. incline up Mount Nebo considerably exceed the amount given in the original estimate.

Digby & Annapolis.—Mr. Mills, M.P., is pressing for government aid for the construction of a branch of this road to connect with Shelburne, N. S.

Duluth & Iron Range.—The contract for the Mesaba branch will be let next week, or at least before April 15. The length of the new branch will be about 15½ miles to the temporary terminus at the Canton mine, in the western part of the Mesaba iron range. The new road leaves the main line near Mesaba station, about 70 miles north of Duluth, and extends in a generally westerly direction to the mines. The line has been located and is now ready for the contractors. The construction work will be fair for that part of Minnesota, which is a mountainous country. The maximum grade will be 52 ft. per mile and the maximum curvature five degrees. The only large bridge will be a plate girder about 64 ft. long. R. Angst, of Duluth, is the Chief Engineer.

Duluth, Messabe & Northern.—Right of way has been granted across the streets and alleys of West Duluth and similar permission has been asked for from the city of Duluth. The application provides that the Duluth & Winnipeg road shall, if it elects, be allowed to run over the tracks of the Duluth, Messabe & Northern in Duluth.

Duluth Terminal Improvement Co.—Articles of incorporation for this company were filed in Minnesota last week, the capital stock being $50,000. The company has been organized to provide the terminals of the Duluth, Red Lake Falls & Northern Road, which is to build north from Duluth. An ordinance has been introduced in the Duluth City Council to grant the company right of way along a number of streets in the city.

Eagle's Mere.—The contractors increased the number of men working on this road North to Eagle's Mere, Pa., last week, and a considerable force is now employed. The new road is to extend from Sonestown, on the line of the Williamsport & North Branch road to Eagle's Mere, Sullivan County. The line is to be narrow gauge, extending directly up the mountain through one of the wildest regions in the State. It is expected to have trains running to the mountain top by July 1.

Fairmont, Morgantown & Pittsburgh.—This line is built and in operation as a branch of the Baltimore & Ohio, from Fairmont to Morgantown, W. Va. The ultimate destination of the road is at Uniontown, Pa., where it is to connect with the Connellsville line. A few months ago it was announced that the company had decided to close up the gap between Morgantown and Uniontown, and that the work would be completed this year. Last week the right of way agents were in Morgantown, and stated that all the right of way from Morgantown to the Pennsylvania State line had been secured, and that work would be commenced in April. It is the intention to have trains running over the road before the first of October.

Farmville & Powhatan.—The company will, it is understood, build its road into Manchester, Va., provided that city will guarantee the interest on $45,000 of bonds. A similar guarantee will be asked of the county of Chesterfield. Surveys have been made for the new line.

Findlay, Fort Wayne & Western.—The extension beyond Huntstown, Ind., the present terminus, is being gradually built, but no contracts for the work have been let, and only a small force is being employed at present. The grading will soon reach the Cincinnati, Jackson & Mackinaw tracks in Paulding County, about 15 miles west of Huntstown.

Florence, Cripple Creek & State Line.—The survey between Florence and Cripple Creek, Col., has just been completed by the party of surveyors under Charles Thorp. The line surveyed is about 18 miles long and is to be extended north to Fremont and the Colorado State Line. The company is a local one organized at Florence. J. A. McCandless is General Manager.

Forest, Meaford & Durham.—A large delegation from the county of Grey, Ont., comprising James Celleland, M. P., C. McKetchine, M. P. P., and others interviewed the Dominion Minister of Railways last week in reference to a subsidy for this road from Durham to Meaford, Ont., about 43 miles. The minister would only say that the matter would have his attention and that the project had large claims for aid.

Fort Dodge & Northwestern.—This company has been organized by Hamilton Browne and others of Fort Dodge, Ia., and a charter will be secured in a few days. It is intended to build a road from Fort Dodge, northwest, a distance of 25 miles to Pocahontas Centre, in the northwestern part of Iowa, which is at present without railroad connection. It is said that a large part of the capital stock has been subscribed and that an Eastern syndicate is interested in the project.

Geneva, Florida & Pensacola.—The organization of this company, noted last week, has not yet been completed, but the directors have opened the stock books for public subscription in Alabama to fulfil legal requirements, and they expect to secure the charter in a few weeks. The road is to extend from Geneva, Ala., southwest to Florala, a new town on the Alabama and Florida state line, about 30 miles from Geneva, and thence to Pensacola, a distance of about 80 miles.

Great Northern.—An attempt is being made to adjust the right of way difficulties at Red Lake Falls, Minn., which have prevented the completion of the branch to that town, which was begun last fall. About $20,000 was asked for the right of way through the city and grounds for terminals which the company desired, and a committee of citizens has undertaken to obtain this right of way. The branch has been graded from St. Hilaire, and a part of the track has been laid.

Gulf & Chicago.—The Chicago syndicate which recently secured control of this property has made favorable progress in organizing a construction company to build the extension to Jackson, Tenn. The line will be about 40 miles long, from Middleton, the present terminus of the road, north, and will connect with several railroads at Jackson. J. J. Williams, the Chief Engineer, has recently made a revision of all the construction notes and these have been forwarded to the new company in New York.

Gulfport.—A declaration of incorporation was filed in Alabama last week preliminary to securing a charter for the road. The terminal of the proposed road will be Mobile Point, adjacent to Fort Morgan, in Baldwin county, and the Mobile & Ohio road, near Citronelle, in Mobile County.

Hinton & New River.—A meeting of the directors of the company was held at Hinton, W. Va., last Friday. It was decided to proceed with the surveys of the line with a view to asking for bids to do the work before July 1 if possible. The road will join with the Chesapeake & Ohio at Hinton, and with the Norfolk & Western at the other terminus in Mercer County.

Houston, Central Arkansas & Texas.—It was expected that this road would be opened for through traffic this week, but it has been decided not to put on regular passenger trains between Alexandria, La., and St. Louis until May 1. The new line is 190 lines long, extending from Alexandria north to a point on the St. Louis, Iron Mountain & Southern, east of Arkansas City. Through trains will run over the Little Rock &

Arkansas City division, and through Little Rock, until the line to connect with the Helena branch is built.

Indianapolis, Logansport & Chicago.—Preliminary surveys have now been completed for the entire line from Logansport south to Indianapolis, and the location has been made also for a considerable distance. The officers state that there is now no doubt about the early building of the line. Negotiations are now pending to secure the funds for construction; about $120,000 of township bonds has been voted along the line. About one-third of the right of way has been secured so far, and this work is now proceeding favorably. The line will extend through the towns of Russiaville, Kempton, Sheridan and Augusta to Indianapolis, a distance of about 70 miles. For most of the distance the line is through an agricultural section, the greater part of which is now remote from railroads. About 20 miles will be through the natural gas region. The officers have not yet decided when to let the contracts, but the country is open, and there will be only one long bridge. This will be 325 ft. long, with two spans. The maximum grade is 35 ft. to the mile and the maximum curvature three degrees. E. N. Talbot, 56 La Salle street, Chicago, is President.

Manitoba & Southeastern.—This company is applying to the Dominion Parliament for an act allowing it to construct 30 miles of road the first year and 20 miles a year afterward of the line between St. Boniface and St. Anne's, Man.; also to acquire and work coal and iron mines to the extent of 10,000 acres.

Mankato & Northeastern.—Engineers are in the field completing the profiles of the line for submission to contractors. There is considerable strife over right of way into Mankato, an ordinance granting this company entrance near the bank of the Minnesota River being now before the city council. The Chicago, St. Paul, Minneapolis & Omaha is endeavoring to secure the same right of way in order to change its line through the city, and finally a terminal company is asking for a franchise covering this entrance into the city. The Mankato & Northeastern has asked Blue Earth County to vote on the question of granting $30,000 in bonds to aid in construction.

Maryland Roads.—Bills have been introduced in the legislature authorizing Talbot county to subscribe for $15,000 of the stock of the Easton, Trappe & Cambridge Railroad, and amending the company's charter; changing an appropriation of $58,000 in aid of the Elkton & Sassafras road to the Easton & Northern, which proposes building a road from Easton to Singerly.

Mexican Roads.—Rafael Dondé and J. Va'enzulla, of the City of Mexico, are constructing a line from the mines of the Compania Carbonifera de Piedras Negras to a connection with the Mexican International.

Work is reported to be in active progress on the road that is to connect Campeche with Calkini, and the line will soon be in operation as far as Pomuch, a place distant some 40 miles from Campeche.

Mississippi River & Bonne Terre.—Regular passenger service over the Doe Run extension was established April 3, and trains will run daily between Doe Run and Riverside, Mo., where they connect with trains to and from St. Louis over the St. Louis, Iron Mountain & Southern.

Missouri, Kansas & Texas.—Vice-President Waldo is reported in the local papers as stating that the company has decided to build a new road to one of the deep water harbors on the Gulf of Mexico. The new line will probably be an extension of the Taylor, Bastrop & Houston road, beginning at the present terminus of that branch at Boggy Tank, east of Houston, and extending southwest to Galveston or Velasco. The proposed extension of this route into Houston may also be begun this year.

New Iberia & Vermillion.—The local committee appointed to secure the right of way between Abbeville and New Iberia, La., completed that work last week. Most of the preliminary work has now been attended to and the survey has been made by a party of Southern Pacific engineers between New Iberia and Abbeville, La., 15 miles. The grading will probably begin during April.

New Roads.—The engineers who are making a survey west of Salt Lake City for the Deep Creek Railroad projected by Col. T. P. Murray, of Salt Lake City, have run the line for about 70 miles. The surveys have been made through Tooele City and Stockton to Dugway, and are now nearing the Nevada line.

Now that it has become certain that the Maine Shore Line will not be completed this year the business men of Calais and other towns in eastern Maine are discussing another proposed road. It is suggested that if a line were built from Princeton, on the St. Croix & Penobscot Road, west to Mattawamkeag, on the Maine Central, a distance of 40 miles, the benefits would be nearly as large as from the construction of the Shore Line. The distance by this route to Bangor would be 118 miles, over 60 miles of the Maine Central, while the distance by the Shore Line would be 158 miles.

New York & Boston.—J. A. Bostwick, the chairman of the directors of the New York & New England, states that the charter of this road recently taken out in New York has been obtained in the interest of the New England, and is intended to give that road a line to a point near Whitestone, on Long Island Sound. A charter had previously been secured in Connecticut for a road from New Haven to Port Chester, on the New York State line, and the new road will be a continuation to Long Island Sound.

Norfolk & Carolina.—The General Manager confirms the report that a survey is being made for a line to Albemarle Sound. The engineers began at Aulander and have now completed about 20 miles of the survey through Windsor in the direction of Avoca. There is no certainty whether the company will build the road this year, as much depends upon the success of securing the right of way, and on what the survey will develop, and the estimates of the engineers as to the cost of the work.

Norfolk & Western.—The contractors are reported to be employing over 5,000 men on the construction work on the Ohio & West Virginia extension. The principal grading on the northern part of the line which remains to be completed is south of Dunlow, and on the southern section about Pondmouth, the two sections aggregating probably 50 or 60 miles.

The contract for building the Russell Creek branch, recently noted, from Virginia City, Va., to the Clinch Valley Coal & Coke Co.'s mines, three miles, has been awarded to Vaughn & Suck.

Owensboro, Falls of Rough & Green River.—A new survey has been made in the last few weeks for the proposed branch from Fordsville south about 10 miles to intersect the Newport News & Mississippi Valley road at Horse Banch, Ky.

Pensacola & Northwestern.—President Van Praag states that the organization of the Mexican Gulf, Pacific & Puget Sound road under this more modest title will soon be effected. When the legal consolidation of the roads in Alabama and Florida have been made he expects to arrange for the commencement of the work on one of the sections of the system for which the surveys have been completed, probably in the mineral belt in Western Alabama.

Philadelphia & Reading.—The New York Construction Co. is to build the new West Chester branch of this road which will be about nine miles long. Surveys have been made from a point on the Chester Valley branch near Glen Loch, Pa., south to West Chester, which has a population of about 10,000, and intersecting the Pennsylvania at Zermatt. The right of way for the line, including grounds for stations has been secured. The construction of the line will cost $200,000 and a large part of this amount will probably be subscribed in West Chester. The principal contractor will be George Potts, of 40 Wall street, New York. A charter for the local company is being prepared by R. T. Cornwall, the Chester county attorney of the Philadelphia & Reading.

Pickens.—Grading is to be begun on this line at Pickens, S. C., next week, the contract for that work having been let to J. H. Burkhalter, of Augusta. The line has been located from Easley, on the Richmond & Danville, northwest to Pickens, nine miles, and will be completed in September. The funds so far secured for construction work amount to about $15,000 in cash subscriptions and $20,000 in county bonds, which will be payable when the road is in operation. Julius E. Bogg, of Pickens, is President.

Pittsburgh & Western.—The double tracking work on the division between Pittsburgh and New Castle Junction has been resumed this month. In a few weeks a large number of men will be employed on the work. About 13 miles of second track has been built between these points. Work has been commenced on that portion of the line between McKim's and Zelienople, a distance of seven miles, and it is the intention to finish that section within 60 days. About 42 miles of second track must be built to complete a double track line to Newcastle Junction.

Richmond, Nicholasville, Irvine & Beattyville.—The Receiver states that nothing has been done recently on the eastern extension of the road along the Kentucky River further than the order of the court to the Receiver to ascertain the cost of constructing the new road. This will probably be done from the old construction notes of the engineers made in 1890, when the main line was being built. The extension from Irvine to Beattyville, Ky., is about 37 miles, and the grading has been partly completed for the first 20 miles. The towns and counties along the route voted several thousand dollars' worth of bonds to aid in building the line, which will be forfeited if the road is not completed this year.

Roanoke Belt.—The Norfolk & Western has awarded the contract to Henry Davin for the extension of its belt railroad at Roanoke, Va.

Rockaway Valley.—The grading on the projected extension from Mendham west to Morristown, N. J., was begun recently. The work now in progress is being done by the Rockaway Valley Manufacturing & Contract Co. The surveys for the Morristown extension, which is about seven miles long, were made last summer, and the time since then has been occupied in securing the right of way and in raising a subsidy of $20,000.

St. Louis & Birmingham.—The contracts for grading this line are reported to have been let for a distance of 65 miles from Clifton, Tenn., to Florence, Ala. A small force has been working on the grading for some time past, and some track has been laid, but it is now proposed to push work vigorously during the summer months.

St. Paul & White Bear.—Under this name the North St. Paul motor line will be extended and changed to an electric line. About five miles of new road will be built, making a total length of a fraction over 11 miles. The gauge will be 4 ft. 8½ in. and the rails 50 lbs., making, in addition to the passenger service, a belt transfer connecting the St. Paul & Duluth; Chicago, St. Paul, Minneapolis & Omaha; Wisconsin Central and "Soo" lines. It is probable that a branch two miles in length will be built to reach the Chicago, Milwaukee & St. Paul, and the Chicago, Burlington & Northern, and by means of the South St. Paul, Belt Line & Bridge Co. the Chicago, St. Paul & Kansas City.

Saltair.—The company has completed arrangements for building the new road to the Saltair beach, on Great Salt Lake, 15 miles south of Salt Lake City, and will soon let the grading contracts. The line has been cross sectioned, and the order for the 60-lb. rails has been placed with the Colorado Coal & Iron Co. at Pueblo, and orders for 40 cars have been placed in the East. The road is to be completed by June. Matthew White, of Salt Lake City, is General Manager.

Savannah, Americus & Montgomery.—Through trains on the Montgomery extension will be put on about April 15. The heavy rains have delayed the ballasting and prevented the company opening the line for regular passenger traffic at the earlier date proposed. Connecting tracks are now being built between the terminus of the road at Clisby's Park, just beyond the city limits of Montgomery, and the Montgomery Terminal road, recently acquired by the company, which reaches the warehouses in the city. Freight trains will be run after May 1.

Southern Pacific.—Several new branches are proposed in the San Joaquin Valley in California, and which it is expected will be completed this summer. One of the new lines will start at Fresno and extend west a distance of 14 miles in almost a straight line to a point on the Tracy branch that runs south from Tracy. When this new piece of road is completed it will, with the line that now runs east from Fresno to Sanger, make a through road across the middle of the valley. Another new line is to start at Bakersfield and continue in a southerly direction through the Kern Valley. It will be about 50 miles long and will reach extensive deposits of bitumen as well as open up a very fertile section. The contract for its construction has already been let, and the grading will be easy work.

The contracts for the tunnel work on the coast division between Santa Margarita and Ellwood, Cal., will probably be let in a few weeks, when President Huntington reaches the Pacific Coast. The company has been employing a small force on the light work on this new road for some time, building the approaches.

Tennessee Central.—An election will soon be held at Trenton, Tenn., to consider the subscription of $50,000 to the capital stock of the railroad. If the result is favorable a New York firm is ready to complete the road between Trenton and Milan, a distance of 12 miles.

Tionesta Valley & Hickory.—The company was chartered in Pennsylvania April 4. It is proposed to build a line five miles long through Forest County to extend from the village of Nebraska to Ross Run. The capital stock of the company is $50,000. Truman D. Collins, of Nebraska, is President.

Tuscaloosa Northern.—Capt. F. M. Abbott, of West Point, Miss., proposes to let the sub-contracts for the work on this road by April 15. The line will be about 17 miles long, and is to be built to the Maxwell Coal Mines of the Tuscaloosa Coal, Iron and Land Co., north of Tuscaloosa, Ala.

Unadilla Valley.—Efforts have recently been renewed to secure the right of way for this road, which is to extend through the Unadilla Valley, south of Utica, N. Y. Funds have been promised to complete the work on the condition that the right of way is given the company by the various towns. The road has been located, and eight miles was graded and a mile of track laid by a former company in 1890. The line is about 20 miles long, extending from New Berlin, in Chenango County, north through South Edmeston, Columbus, West Edmeston, Leonardsville to Bridgewater, Oneida County, New York, connecting the New Berlin branch of the New York, Ontario & Western with the Delaware, Lackawanna & Western and forming a direct route from Utica to the south. The contracts for grading will probably be let in May and the officers expect to have the road open for business in November. The grading will be light, the maximum grade being 30 ft. per mile and the maximum curves four degrees. D. E. Culver, of 80 Broadway, New York City, is Chief Engineer.

Union Pacific.—Louis Carr, of Denver, has secured the contract for the construction of several short coal branches to be built near Trinidad, Col., and will soon commence grading.

Wabash, Chester & Western.—The projectors of the Terre Haute, Saylor Springs & Chester have begun negotiations for a consolidation of that line with this company, and meetings between the different officers were held last week. An extension of this road is being built from Tamaros northwest about 20 miles to Mount Vernon, Ill., where it connects with the survey of the former line. Surveys are soon to be made by the new company toward Terre Haute, Ind., and the projectors have secured large subsidies from the towns along the route.

Watertown, Sioux City & Duluth.—There seems to have been an error in the press report that the engineers were not allowed to continue the survey for this line through the Sisseton Indian Reservation north of Watertown, S. Dak. The survey is being run through the reservation from Watertown north along the Coteaux Hills to Big Hollow, and thence along the Lake Traverse Valley for about 20 miles to Hankinson, N. Dak., on the Great Northern. A new survey may be made leaving the mountains 20 miles south of Big Hollow and extending through Browns Valley near the Minnesota State line and along the west bank of Lake Traverse, the present route being about 15 miles west of this line. E. H. Banvard, of Watertown, is Secretary.

West Virginia & Pittsburgh.—The tracklaying forces on this road have been transferred from the upper end of the line to beyond the Buckhannon River to await the completion of the bridge over Elk River. Inability to get supplies down the road is the cause of the transfer.

Wheeling & Belmont.—A charter for the company was filed in Ohio last week for a line from Wheeling southwest to Belmont, O. The capital stock is $300,000.

Wheeling & Connellsville.—The surveys for this line are progressing most satisfactorily. The engineers have already covered more than half the distance from Wheeling eastward, and are now working beyond Waynesburg, Pa. The Waynesburg route seems to be the most available and a careful survey is being made, and when the route is decided upon there will be but little surveying work to do. The line upon which the engineers are now working goes from Waynesburg by way of Muddy and Whiteley's creeks and McCann's ferry.

Winnston & Bone Valley.—The company has been chartered by James E. Griffin, Mitchell Brice, John G. Scruggs and others, to build a road from Winnston to a point near Phosphoria, Fla., thence in a southwesterly direction through Polk, Hillsboro and Manatee counties to the mouth of the Manatee River. The length of the road is to be about 60 miles.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals), and net earnings of the road and its auxiliary lines for February were as follows:

	Gross earnings.	Operating expen.	Net earnings.	Oper. mileage.
Roads owned and controlled	$2,497,961	$1,952,879	$545,082	6,540.06
Roads jointly owned.				
Atchison's one-half	124,057	125,277	def. 1,220	587.34
T't'l Atchison system	$2,622,018	$2,078,156	$543,861	7,127.40
St. Louis & San Francisco:				
Roads owned and controlled	$517,647	$327,543	$190,104	1,328.17
Roads jointly owned.				
'Frisco Co.'s one-half	121,603	121,615	def. 12	535.75
Total 'Frisco system	$639,250	$449,158	$190,092	1,863.92
Aggregate, both systems	$3,261,268	$2,527,314	$733,954	8,991.32

The comparative statements for all lines is as follows:

	Gross earnings.	Net earnings.	Gross earn'gs.	Net earn'gs.	Mileage.
			—Per mile—		
Atchison System:					
Feb., 1892	$2,622,018	$543,802	$367.88	$76.31	7,127
Feb., 1891	2,217,129	519,544	311.61	73.03	7,114
Increase	$404,889	$24,318	$56.24	$3.28	13
'Frisco System:					
Feb., 1892	630,250	190,091	342.96	101.96	1,864
Feb., 1891	509,112	183,434	305.12	98.35	1,865
Inc. or dec.	$70,138	$6,657	$37.84	$3.63	dec. 1
Aggregated General System:					
Feb., 1892	$3,261,268	$733,953	$362.71	$81.63	8,991
Feb., 1891	2,726,241	702,978	310.28	78.29	8,980
Increase	$475,027	$30,975	$52.43	$3.34	12

Chicago, St. Paul & Milwaukee.—The statement of earnings and expenses for February is as follows:

Month of February:	1892.	1891.	Inc.
Gross earnings	$2,304,102	$1,878,992	$425,110
Oper. expenses	1,720,179	1,466,396	253,783
Net earnings	$583,923	$412,596	$171,327

Net earnings in 1891 were $412,595; in 1890, $442,550, and in 1889, $395,072.

Eight months, July 1 to March 1:			
Gross earnings	$22,278,054	$19,021,609	$3,256,445
Oper. expenses and taxes	13,955,710	12,460,198	1,495,512
Net earnings	$8,322,344	$6,561,411	$1,760,933

Cleveland, Cincinnati, Chicago & St. Louis.—The following are the comparative statements of the earnings, expenses, etc., for the periods mentioned for the past two years:

Month of February:	1892.	1891.	Inc. or dec.
Gross earn	$1,042,974	$926,595	I. $56,379
Operating expen	759 933	718,096	I. 41,867
Net earnings	$283.011	$208 499	I. $14,512
Fixed charges	209,192	211,661	D. 2,469
Surplus	$73,819	$56,838	I. $16.981
Eight months, July 1 to Feb. 29:			
Gross earn	$9,400,572	$8,950,304	I. $450,268
Operating expen	6,592,411	6,304,371	I. 288,040
Net earnings	$2 808,161	$2,645,933	I. $162,228
Fixed charges	1,707,599	1,724,235	D. 16,636
Surplus	$1,100,562	$921,698	I. $178,864

Illinois Central.—The attempt to cross the tracks of this road at Seventy-first street in South Chicago, made by the Baltimore & Ohio a few weeks ago, to enable it to build a line into the World's Fair grounds, was stopped by injunction. Since this ineffectual effort newspaper statements have been made, credited to an officer of the World's Fair, that 25 ft. of right of way through Seventy-first street controlled by the Illinois Central Railroad, keeps 80,000 miles of railroads from entering the Fair grounds. President Fish has written a letter denying this, and making the following statement of the attitude of his company: "The facts are that the Illinois Central has extended to each of the railroads every facility to reach Jackson Park. In January last, having accepted the proposition made by the Lake Shore & Michigan Southern and the Pennsylvania for the use of our tracks from South Chicago to the Fair, we offered to aid the Baltimore & Ohio in securing a track into the grounds parallel with our two, to put the three tracks under joint management, and divide the receipts in the proportion of two-thirds and one-third. While our offer remained unanswered the Baltimore & Ohio procured rights on a line so located as to cross the main tracks of our South Chicago Railroad at grade in Seventy-first street. As we are running 57 passenger trains daily past that point, and the proposed crossing will greatly interfere with, if it does not absolutely destroy, the usefulness of the South Chicago Railroad as an access to the Fair, and it appearing that the Baltimore & Ohio were about to tear up our tracks at that point, as they had done elsewhere in Chicago within a week, without condemnation or other lawful process, we were, on March 12, obliged to restrain them by injunction. The World's Columbian Exposition Co. were at once advised in writing that our reason for refusing the grade crossing was an unwillingness to imperil the lives of our patrons and blockade the business to and from the Fair, that we had no objection to the tracks of the Baltimore & Ohio Railroad being carried over or under ours at that point, and that if proceedings should be commenced to legally condemn a crossing we would withdraw the injunction, our intention being to let the responsibility for all the consequences of a grade crossing rest with those making it. I am glad to be able to say that it now appears that better counsel is likely to prevail."

Lehigh Valley.—The route now traveled by the passenger trains to and from Jersey City is described as follows: Leaving the Jersey City station of the Central Railroad of New Jersey (westbound) the trains now run over the tracks of the Newark & New York Railroad to its junction with the Newark & Elizabethport branch, which they follow in a southerly direction for about a mile. Then, turning to the west, they connect with the new Lehigh Valley road, recently finished, over the meadow south of Newark, crossing the Pennsylvania Railroad (on an iron bridge) between that city and Waverly, and the tracks of the Central of New Jersey at Roselle. At South Plainfield, 24 miles from Jersey City, the old road is reached, by which, up to last spring, the passenger trains ran to Jersey City, via Metuchen, over the Pennsylvania road.

Louisville & Nashville.—The February earnings show an increase in both gross and net, notwithstanding the loss from the cotton crop. The increase in gross is largely due to the iron traffic. The acquisition of the Kentucky Central on Feb. 1, 1891, increased the mileage, but the earnings from that road are only about $100,000 a month.

	1892.	1891.	Inc.
Gross earnings	$1,784,656	$1,529,781	$254,875
Operating expenses	1,093,946	934,548	159,398
Net earnings	$690,710	$595,233	$95,477
Eight months to March 1:			
Gross earnings	$14,427,413	$13,154,672	$1,272,741
Operating expenses	9,276,094	8,179,812	1,096,272
Net earnings	$5,151,329	$4,974,863	$176,469

Long Island.—A mortgage of $2,750,000, made by the company to the Central Trust Co., was filed last week. The mortgage secures the same amount of bonds issued to pay for the Metropolitan Ferry Company's franchises, its real estate in New York and Long Island City and boats. The railroad company assumed control of the Twenty-third Street and James Slip ferries April 1.

New York Central & Hudson River.—The gross earnings of the system for the month of March, 1892, were $3,577,284, against $3,247,328 for the same month of last year, an increase of $329,956. For the quarter ending March 31 the gross earnings were $10,404,559, against $8,988,175 during the corresponding period of 1891, an increase of $1,416,384. Operations for the nine months, July 1, 1891, to March 31, 1892, show gross earnings of $34,558,177 against $27,514,866 for the corresponding months of the last fiscal year, an increase of 7,043,311. 1891 figures include $185 889, earnings of the Rome, Watertown & Ogdensburg since March 15 only. The earnings of that road in 1892 were $858,557.

New York & New England.—The counsel of the road argued last week before a committee of the Massachusetts legislature on the application of the company for authority to issue new bonds. Charles A. Prince argued that it was important for the road to secure $5,000,000 at a low rate of interest for use in making improvements that were imperatively demanded. It is desired to double track 90 miles of the road, to rebuild a number of bridges, and eliminate a good many crossings. New stations are needed along the entire line of the road. Mr. Prince could give no estimate of the exact amount of the bonds to be issued. The bill provides that bonds may be issued to the extent of one-half the cost of the construction of the road. He thought that an examination would show that more than $40,000,000 had been expended in the construction.

Norfolk & Western.—The directors publish in the annual report a recommendation that authority be given for a further issue of 100,000 shares of preferred stock, of which it is not contemplated to issue more than 50,000 shares during the current year. A sinking fund of three per cent. per annum, payable after Jan. 1, 1893, on the bonds outstanding, is provided, to be applied on and after July 1, 1893, to the purchase and redemption of outstanding bonds. The right is reserved by the company to redeem the bonds at par and interest at any time after ten years.

Panama.—The annual report for the year ending Dec 31 gives the following figures: Gross earnings, $1,937,002, as compared with $1,949,817 in 1890; expenditures, $1,613,201, as against $1,600,943 in 1890; net earnings, $323,801, as against $348,874 in the previous year. The general balance sheet showed a surplus of $1,580,694, an increase over 1890 of $217,741. The decrease in the earnings was explained by the local depression caused by the continued cessation of work upon the canal, and the revolution in Chili.

Paris, Marshall & Sabine Pass.—The sale of this road was ordered last week, and is to occur about July 1. The line has been built for 16 miles from Marshall, in East Texas, toward Paris.

Philadelphia & Reading.—Gov. Abbett of New Jersey withheld his signature to the bill to legalize the lease of the Lehigh Valley and Central of New Jersey, which was passed by the New Jersey Legislature before its adjournment. This prevents it becoming a law. He doubted the constitutionality of the law, and stated that it permitted the companies to reduce the cost of transporting the coal, but contained no provision to compel them to reduce the price of transportation to the consumer. President McLeod states that the refusal of the Governor to sign the bill will have no effect upon the combination. "We will not be affected by the action of Gov. Abbett. The leases were made without regard to legislative action on the part of New Jersey. The Central of New Jersey road has been leased by the Port Reading, and there is no law in New Jersey preventing one corporation operating in that State from leasing another. The Jersey Central is being operated under the lease to the Port Reading and will continue to be so operated. The principal purpose of the bill was to enable dissenting stockholders to have their claims adjudicated. We had not heard of any dissenting stockholders of the New Jersey Central Railroad, but if there were any, the passage of the bill and its approval by the Governor would have enabled them to have their claims adjudicated. The leases will stand as they have been made, and the leased roads will continue to be operated by the Reading regardless of the action taken by Gov. Abbett, but not as conveniently as if the Governor had signed the bill."

St. Louis, Alton & Terre Haute.—The following figures from the annual report of the company has been given out in advance of the pamphlet report for the year ending Dec. 31, 1891:

CAIRO SHORT LINE DIVISION.

	1892.	1890.	1891.
Gross earn	$1,110.426	$1,336.910	$1,435,624
Oper. expen. and taxes	648,678	809,142	854,668
Net earn	$461,748	$527,768	$580,956
Rental	332,095	362.149	303,911
Net revenue	$129,653	$165,618	$187,045

The receipts from the rental of the main line and interest were $555,150, against $606,050 from these sources in 1890. The interest on the funded debt was $469,000, the surplus for the year being $86,150.

Tennessee Midland.—The Virginia Construction Co. has agreed to transfer the stock of this company which it controls, a majority of the shares issued, to T. J. Moss, of St. Louis, President of the Paducah, Tennessee & Alabama road. The construction company built the road from Memphis east to Perryville, on the Tennessee River, 138 miles, and held nearly all its securities. The price paid is understood to be $2,350,000, of which $530,000 is cash and the residue in guaranteed five per cent. bonds. The Paducah, Tennessee & Alabama road is now in operation from Paducah, Ky., to Hollow Rock, Tenn., and is under construction to a junction with the Tennessee Midland. It is projected to Sheffield, Ala., where connection will be secured for Birmingham.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, April 6, 1892.

As was expected, it has been impossible to get a quorum for the meeting of the Advisory Board of the Western Traffic Association, April 12, and Chairman Miller has called a special meeting, to be held in New York City May 10.

The Commissioners of the Western Traffic Association have announced a ruling in regard to action taken by the Atchison, Topeka & Santa Fe in making an excursion rate from Deming, N. M., to Salt Lake City via Pueblo, and Denver. To this the Southern Pacific objected, claiming to be an interested line. The Sante Fe claimed that as it had the short line and the rate sheet did not name any single trip rates via the Southern Pacific line between these points, it was justified in making the excursion rate without giving notice to the Southern Pacific. The Commissioners decide on technical grounds that under the agreement of the Trans-Missouri Association the Southern Pacific should have been notified of the proposed action and consulted before the announcement.

Several of the members of the Western Freight Association desire Chairman Midgley to call a special meeting on the subject of rates and divisions in connection with lake boats on trans-Mississippi River traffic destined to Eastern points via Chicago and Buffalo, which Mr. Midgley is unwilling to do. He states that he is authorized and willing to treat with boat-line managers for an arrangement whereby this traffic shall be carried at the same rates as prevail between East St. Louis and Buffalo. Further than this he thinks would neither be safe nor in accordance with the agreement to go.

The Chicago & Northwestern recently proposed shortening its time between Chicago and St. Paul, but the other lines objected so strongly and threatened so loudly to reduce the fare if the train was put on that the scheme was abandoned, but the Northwestern announces that it will, commencing April 10, put on a "daylight train," leaving Chicago at 8:15 a. m., arriving Minneapolis 9:55 p. m., daily except Sunday.

At the February meeting of the Trans-Missouri Freight Association application was made for the establishment of a rate of $2 per ton on ore and bullion from Colorado common points to the Missouri River. A disagreement arose and the matter was appealed to the Commissioners of the Western Traffic Association who have decided to refuse the application, until they can get a decision from the Advisory Board. The case is a peculiar one. It appears that the Union Pacific takes ore from Idaho mines to Denver, there allows it to be stopped for smelting, and then carries it to the Missouri River at the regular Missouri River rate through, which is $18 a ton, the rate to Denver being $16. The smelting takes out about 60 per cent. in weight, and this *is allowed to be made up* by an equal weight of bullion and matte, which, of course, comes from ores that the smelters get from other points. In other words, 60 per cent. of the bullion shipments from the Denver smelters to the Missouri River consists of freight originating in Denver, which is practically carried at $2 a ton. The competitors of the Union Pacific, finding no other way to meet this arrangement, asked for the privilege of reducing the tariff rate ($8 a ton) from Denver to the Missouri River to $2. The Union Pacific's answer to the complaint evades the main point at issue. The total shipments of bullion eastward from Denver, Colorado Springs and Pueblo for two years have been 168,000 tons, of which the Union Pacific carried 52 per cent. That road took practically all the bullion from Denver eastward.

The lake and rail lines which have been contracting freight for some time, are taking wheat to New York at 9½ cents a bushel and corn at 9 cents. Vessels are taking corn at 3 cents to Buffalo. This brings the wheat rate down to 3½ cents. When navigation opens, which will be in about 15 days, the grain fleet, with nearly 5,000,000 bushels, will commence to move out.

The lake managers have agreed to adopt for this season (April 1) the tariff in effect at the opening of navigation last year. The rates are as follows:

From Duluth, Washburn and West Superior:

To	1	2	3	4	5	6	Flour.
New York	75	65	50	35	30	25	2¼
Philadelphia	73	63	48	33	28	23	20¼
Boston and Boston points	85	71	55	40	33	30	27½

From Chicago, Milwaukee and Gladstone:

To	1	2	3	4	5	6
New York	60	52	40	30	25	20
Philadelphia	58	50	38	28	23	18
Boston and Boston points	70	58	45	35	30	25

Chairman Finley has informed the Wabash that instead of being allowed to make reduced rates as heretofore to meet Central Traffic Association competition from all points east of the Mississippi River, hereafter in its territory west of the Illinois Central and Vandalia roads the reduction should be restricted to points of positive competition with outside lines, and to points where, under the requirements of law, rates thus made may be carried as maximum figures.

Armour & Co. have begun 21 suits in the Circuit Court to recover in the aggregate $1,155,000 from various railroad companies for overcharges on dressed beef. It is understood that the other large beef shippers have taken similar action. The alleged overcharges occurred several years ago when tariffs were readjusted after the passage of the Interstate Commerce law.

Traffic Notes.

Two trainloads of cattle were shipped from Genoa, Neb., direct to the Atlantic seaboard last week, in Kent's palace cattle cars, the cattle being for shipment to Liverpool.

The mileage tickets of the Philadelphia & Reading, the Lehigh Valley and the Central of New Jersey have been made usable on either or all of the roads, though certain important divisions are excepted.

Competition between rival roads for the transportation of passengers to a reunion of ex-Confederate veterans has brought about an excursion fare of $2.50 for the round trip from Dallas, Tex., to New Orleans, an unheard-of reduction for that locality.

The Pennsylvania has made a large reduction in local and season ticket fares between Pittsburgh and Greensburg and intermediate stations. The single trip rate from Pittsburgh to Wilkinsburg is 10 cents, and limited round trip 15. The competition of fast street car lines seems to have been the cause of these reductions.

Eastbound Freight Shipments.

The shipments of eastbound freight from Chicago by all the lines for the week ending April 2 amounted to 92,913 tons, against 73,578 tons during the preceding week, an increase of 19,435 tons, and against 76,654 tons during the corresponding week of 1891, an increase of 16,259 tons. The proportions carried by each road were as follows:

Roads.	W'k to Apr. 2.		Week to Mar. 26	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	12,832	13.8	10,993	15.0
Wabash	11,082	11.9	8.407	11.5
Lake Shore & Michigan South.	8,802	9.5	7.531	10.3
Pitts., Ft. Wayne & Chicago	5,815	6.3	7,002	9.5
Pitts., Cin., Chicago & St. Louis	4,307	4.6	4,188	5.7
Baltimore & Ohio	4,898	5.3	5,622	7.7
Chicago & Grand Trunk	14,572	15.7	11,509	15.7
New York, Chic. & St. Louis	7,607	8.2	6,198	8 4
Chicago & Erie	16,012	17.2	9,391	12.5
C., C. C. & St. Louis	6,986	7.5	2,737	3.7
Total	92,913	100.0	73,578	100.0

The three Vanderbilt lines together carried 13.5 per cent, while the two Pennsylvania lines carried 10.9 per cent.

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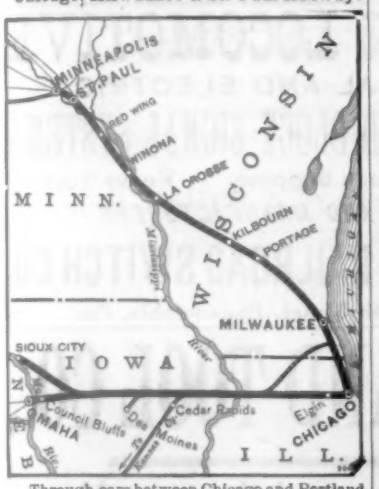

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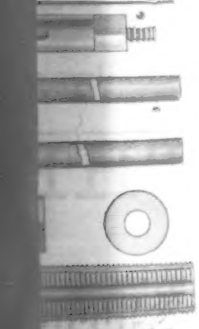

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